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Henry S. Graves, Forester.

SOME PUBLIC AND ECONOMIC ASPECTS OF THE LUMBER INDUSTRY.

U.S. Forest service.

STUDIES OF THE LUMBER INDUSTRY.

PART I.

BY

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SOME PUBLIC AND ECONOMIC ASPECTS OF THE LUMBER INDUSTRY.

THE INDUSTRIAL SIDE OF FOREST CONSERVATION.

The United States owes no small part of its economic development to its forests. Their timber has largely built up the homes of the country, its business establishments, its industrial structures and improvements. They have supplied raw material for many manufactures. The abundance and cheapness of timber have contributed very largely to the economic independence of the United States and to its industrial leadership.

These resources have been put to use through an industry which in energy, rapid development, and mechanical efficiency has outstripped that of any other country. The forests of other nations, like Russia, are comparable in extent, but have never attained a like economic value because no comparable industries have grown up to use them.

The importance of our forests and forest industries gave general support to a national policy of conservation a few years ago when it was realized that the timber supply was being rapidly used up. Hitherto this policy has dealt directly with but a portion of the forest lands in public ownership. The much vaster areas privately owned it has reached only through educational work in forestry and the impetus given to the protection of timberlands from fire. It has touched conditions in the forest-using industries only through research in their methods and processes. There has been, however, an unquestioned response to the conservation movement by the forest industries in better protection of timberlands and closer use of their raw material.

The last six or seven years have brought better knowledge of the timber resources of the United States, better information about their renewal, better insight into the strength and weakness of the forest-using industries. These years have shown particularly how forest conservation is affected by economic conditions in the manufactures whose raw material is wood. Demoralized lumber markets affect the value of timber, the stability of its ownership, the degree to which it is wasted in exploitation, and the possibility of carrying out any far-sighted plan of forest renewal. The character of timber ownership, on the other hand, reacts upon lumber production; hence upon the manufacturer, distributor, and consumer. The interests of the public, locally and nationally, are touched at many of these points.

These industrial conditions, with their reaction upon the forests, have raised a question as to whether the public forest policy of the United States goes far enough. Particularly does better understanding of the conditions in the timber-using industries and their effect upon forestry and forest use seem desirable.

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A STUDY BY PUBLIC AGENCIES.

A study of these conditions has been made by the Forest Service in cooperation with the Bureau of Corporations and later with the Federal Trade Commission. Its purpose was to obtain the facts necessary to an understanding of the lumber industry and the further development of a public forest policy. This study has sought to deal constructively with the problems of lumbering and to aid the industry to a better understanding of them.

It has been impossible to make the inquiry as comprehensive as would have been desirable. It was necessary to limit its economic phases to studies of timber ownership and lumber manufacture in four regions which contain the bulk of the forest resources of the United States and furnish the greater part of its softwood lumber; a study of lumber distribution in 11 States of the Middle West; and a study of the substitution of other structural materials for wood.

The results of each of these investigations will be embodied in a separate publication. It is attempted here simply to present a bird's-eye view of the whole, with a few conclusions which may warrant special consideration.

A large part of the data essential to this study was obtainable only through the cooperation of lumber manufacturers, lumber distributors, and timber owners. Their assistance is deeply appreciated.

THE POINTS WHICH STAND OUT.

This study has shown that the main problem of the lumber industry is a forest problem. It is a problem which has grown out of the quantities of cheap timber acquired from the public domain. The lumber industry of the West is carrying a large forest surplus beyond the present requirements of its sawmills and logging camps, but essential for future needs. Speculation in timber has been interlocked with lumber manufacture and to a considerable degree has dominated and handicapped the productive branch of the industry.

Too great a burden of timberland investments is thus the first cause of instability in the lumber business. Excessive mill capacity, poor financing, and low average efficiency in manufacture and merchandising add to its weakness. The combined result is an ill adjustment of lumber production to the requirements of its market. Competition in manufacture is not only keen but often destructive.

The public is not concerned with the security of timber investments or the outcome of speculative ventures. The prosperity of many regions, however, depends in no small degree upon lumbering as a large tax payer, a gigantic employer of labor and capital, and the chief customer of many other industries. And nationally the public has a vital interest in the economical use of present timber supplies and in continued forest production after logging. Waste in either respect will tell inevitably in the cost of lumber, paper, and other products manufactured from the diminishing forest resources of the United States. It has told already in many of the older "cut-out" States.

A more stable kind of forest ownership, divorced from manufacture to a larger degree than now, must come about before the ills of the lumber business can be permanently cured. It must provide for regrowth on cut-over lands no less than for carrying surplus timber until the productive industry needs it. The extension of public forest ownership, State and National alike, should have a large part in bringing this about. Private ownership has shown itself ill-fitted to the task, at least in the larger forest regions. Much can be done also by public and private cooperation in taxation and fire protection; and, to insure the regrowth of logged-off forests, reasonable public regulation of the handling of private lands will unquestionably find a place in working out the problem.

Better conditions in lumber manufacture depend largely upon the industry itself, and mainly upon the individual operator. Wholesome forms of cooperation which will aid efficiency are desirable if safeguarded against monopolistic uses. They are wholly distinct from restraints upon trade like joint control of production.

Changes in the competitive status of the lumber industry—as in the regulation of its output—can come about only with a different national conception of the country's basic resources. The adjustment of public and private interests in a national policy which seeks the wisest use and perpetuation of these resources and controls the industries which exploit them may then become possible; but in industrial organizations to that end, the public should have a direct and a ruling voice.

This is a wholly different thing from the common conception of industrial combination which seeks only immediate business advantages and makes no adequate provision for public control. Such combinations are not desirable in the public interests; and, in themselves, would be ineffective in holding back the forces causing overproduction of lumber, particularly the pressure of large timber holdings.

PRESENT CONDITIONS IN THE LUMBER INDUSTRY.

THE INDUSTRY AS IT EXISTS TO-DAY.

Beginning as a widespread industry of small units, like farming, lumber manufacture has run more and more to groups of large mills which move from region to region and use up the forests of each in turn. Its 49,000 plants, however, include every diversity in size and machinery; and the small mill comes back after the large mill is cut out.

About 40 billion feet of lumber are now cut yearly from 2,700 billion feet of standing timber, but the latter furnishes raw material for many other products. The industry seems to have been built up beyond the needs of its market, for at least a third of its saws are idle.

The importance of lumbering is emphasized by its investment of 2 1/3 billion dollars and its employment of over 900,000 men. The interrelation of its parts—timber owning, logging, manufacture, and distribution—is far from uniform, and business organizations varying widely in scope and methods are found side by side.

Lumbering comes next to agriculture among the basic industries of the United States. It has been identified with the early development of every section of the country except its prairies. For a long period lumbering was a local industry, with little logging operations and water-run sawmills supplying their own villages or counties or the vessels leaving their own ports. With increasing population and demands for wood, the eastern waterways were used to transport logs or lumber from interior forests. The construction of the canals carried the industry still farther from the consumers of its products, and quantities of lumber were moved by barge for long distances to the seaboard. The later development of lumbering has probably been identified with the extension of railroads more closely than has that of any other industry. The lumberman in many instances has been a pioneer railroad builder; and many common carriers of to-day were laid a few decades ago as part of a logging or sawmill enterprise.

Early in the nineteenth century numbers of large mills with many "up-and-down" saws under one roof were operated by water power on the Penobscot, Hudson, and Delaware Rivers, and lumbering grew to a large industry along these waterways. The distribution of lumber by rail rapidly developed large-scale production, concentrated in the areas of softwood timber which had the greatest utility for the bulk of the country's requirements. With this appeared the very large, highly developed sawmill and a more intensive organization of the industry. White-pine lumbering in the Lake States produced the big organizations and large capitalization which have been characteristic of the principal manufacturing regions ever since. Lumbering in the South and West has been organized largely along the lines developed successfully in the great pine region of the North, which dominated the industry of the country from about 1875 to 1900.

Growing out of railroad development and the concentration of manufacture, together with the large toll usually taken by forest fires, came the rapid depletion of stumpage, section by section, and the shifting of large scale production to new regions. This is brought out by the relative lumber cut of various regions since 1850.

Lumber cut, by groups of States, in per cent of the total.

Year.	North-eastern States.	Lake States.	Southern States.	Pacific States.	Year.	North-eastern States.	Lake States.	Southern States.	Pacific. States.
1850.....	54.5	6.4	13.8	2.9	1890.....	18.4	35.3	15.9	7.8
1860.....	36.2	12.6	16.5	6.2	1900.....	16.0	27.4	35.3	9.6
1870.....	36.8	24.4	9.4	2.6	1914.....	9.0	10.5	47.7	19.3
1880.....	24.8	33.4	11.9	3.5					

Viewed graphically, these figures form a series of overlapping waves. The lumber cuts from the Northeast[1] and the region of the Great Lakes have dropped off to small proportions of the total. The cut from the South is now at its height, and that on the Pacific Coast is rising. Aside from the Northeast, three or four decades seem to mark the life of large-scale production from each of the great forest regions.

Concentration of manufacture in regions of large forest resources is reflected in one type of lumbering operation; rapid exhaustion of those resources is reflected in another type. When the bulk of the timber is cut and the large mills move on, the small mills characteristic of the pioneer days return, working on the odds and ends of virgin stumpage, on the less valuable species which their larger predecessors may have utilized only in part, and as time elapses on second growth. In portions of the United States where economic conditions never favored the development of large operations and good local markets give the small mill a further advantage, as in central New England, it has never been displaced. Everywhere it tends to become the permanent unit in forest industry, as in the older countries of Europe.

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[1] The lumber cut in the Northeast has held its own in amount although dropping in its proportion of the total. It is, however, much more widely distributed than formerly and split up among a larger number of mills.

Great diversity in size and character is thus found among the lumber manufacturing plants of the United States. The most complete information regarding its sawmills was obtained in the census of 1909. There then existed 4,548 mills which cut less than 50,000 feet each during that year; 28,459 mills which cut from 50,000 to 500,000 feet; 6,468 mills which cut from 500,000 to 1,000,000 feet: 5,443 mills which cut from 1,000,000 to 5,000,000 feet; 783 mills which cut from 5,000,000 to 10,000,000 feet; and 888 mills which cut over 10,000,000 feet. This enumeration covers every variety and style of sawmill—the little stationary plant with its sash saw, worked up and down by water power; the portable sawmill, often operated by a traction engine; the permanent mill of medium size and simple machinery; and the large plant with its complement of main and secondary saws, kilns, and planers, which may turn out 250,000 feet of lumber every day. The total number of mills in that year, including 3,154 idle plants, was 49,738.

The vital facts about the lumber industry in the United States and its broad regional distribution are shown on the accompanying map (fig. 1). The estimates of merchantable saw timber in the country, excluding Alaska, total 2,767 billion board feet. This is the estimated yield of sawn lumber, not of logs. It is based upon the existing standards of utilization in each region, not upon the maximum cut of lumber which could be obtained if all of the timber in the country were manufactured with the least possible waste. If all logs and tops were used as closely in the Northwest as in New England, for example, the lumber cut from its timber could probably be increased from 20 to 30 per cent; but since such close use of the raw material will not come about for a long time, it can hardly be considered in estimating the forest resources of the country. Nor does this figure include material too small or defective for saw timber which can, under favorable market conditions, be utilized for poles, fencing, fuel, or pulpwood. It thus is not comparable with the 101 billion feet estimated as the total yearly consumption of wood on page 91. The estimate of standing timber must be increased probably a third or more to cover all of the raw forest material in the country, although a considerable part of this increase will never, by reason of limited markets, be available for the uses which it might supply.

The most striking fact brought out by these statistics is the installed capacity of the sawmills in the United States, 117,486,000,000 feet per year. This is 71.5 billion feet, or 160-odd per cent, greater than the largest amount of lumber believed to have been produced in any one year, 46 billion feet in 1907. The estimate of manufacturing capacity is based upon the 42,041 operating mills cutting over 50,000 feet, which were reported by the census of 1909. These were grouped by size, an average daily cut assigned to each group, and the possible working period for all sawmills placed at 10 hours per day and 275 days a year. This estimate is undoubtedly greater than the actual cut of lumber which it would be possible for the sawmills of the country to produce. While all of the mills actually did manufacture lumber in 1909, a portion of them have undoubtedly been dismantled subsequently or become out of date so that they could not again produce lumber at a practicable cost. Others have exhausted the supplies of timber available to them and thus been eliminated as factors in the future cut of the country. The yearly destruction of sawmills by fire is relatively heavy. On the other hand, a certain number of new mills have been built since 1909.

The greatest excess capacity exists in the large groups of small mills, particularly in old lumbering regions. The exhaustion of timber and the inefficient character of many of these old plants will eliminate an increasing number of them. There can be no question, however, that the lumber industry is equipped to produce at least 50 per cent more lumber than it has actually cut and marketed at any time in its history. In the regions of most active present production the unused capacity of the sawmills is abnormally large.

Lumbering still holds its place as one of the basic industries of the United States. Its logging and milling branches rank first among the manufactures in the employment of labor. Their 736,000 employees include 10¼ per cent of the wage earners in all manufacturing industries. They are exceeded only by the farms, the railroads, and the mining industries as a source of employment for labor. They rank third among manufactures in the value of their annual product, $1,156,000,000 in 1909, dropping behind the meat packing and metal industries only in this respect.[1] The retail lumber establishments in the United States, estimated at 42,000 in 1914, add 126,000 employees to the total pay roll of the industry. Their sales of lumber aggregate 27 billion feet a year, and their annual sales of all merchandise reach a total of $1,432,000,000. The manufacturing and retail branches of the industry have a combined investment of perhaps $2,381,000,000.[2]

The lumber industry comprises five more or less distinct branches. These are:

(1) The ownership of standing timber, which often must be held over considerable periods before its exploitation is possible.

(2) Logging, or cutting trees into logs and delivering them to sawmills, often requiring transportation over considerable distances by rail, stream driving, or towing.

(3) Manufacturing logs into lumber, including its seasoning, surfacing, and finishing into special forms.

(4) Wholesale lumber distribution, which bridges the gap between the sawmill and the retail lumber yard, the wood-using factory, and the railroad; and

(5) Retail lumber distribution, which places the bulk of the product, in small lots, in the hands of its consumers.

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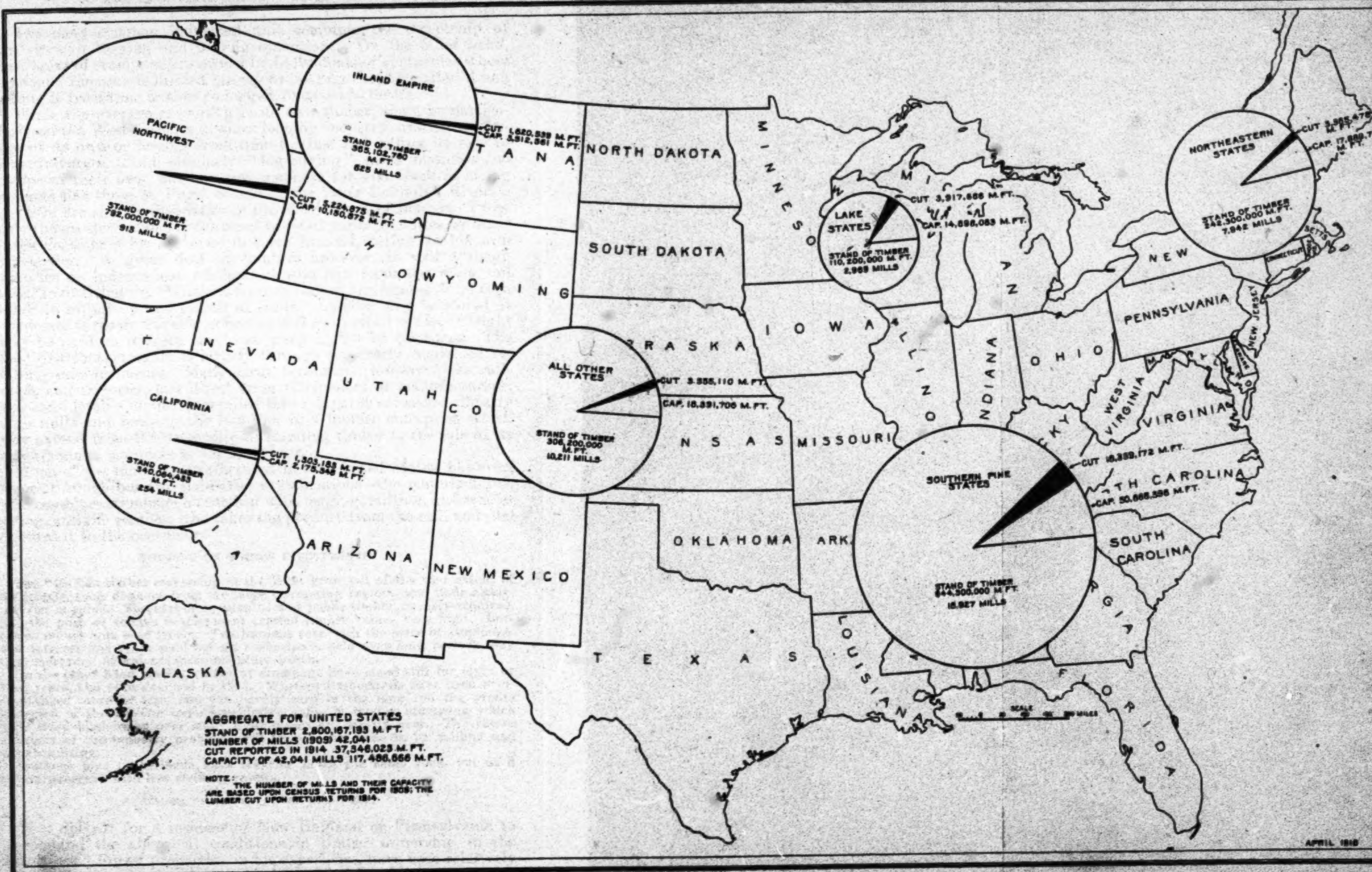
[1] Data from the Thirteenth Census. The last figure includes the product of all logging camps, sawmills, box factories, and planing mills operated as separate establishments. The value of part of the product thus appears more than once, in its different forms.

[2] The retail figures are based upon a study of lumber distribution by the Forest Service in 11 of the Central States, in 1914, whose results have been extended to cover the whole United States in proportion to population.

U. S. Department of Agriculture, Secretary's office, Report No. 114.


PACIFIC NORTHWEST
STAND OF TIMBER 792,000,000 M. FT.
913 MILLS
CUT 5,224,875 M. FT.
CAP. 10,150,872 M. FT.
INLAND EMPIRE
STAND OF TIMBER 365,102,760 M. FT.
625 MILLS
CUT 1,620,538 M. FT.
CAP. 3,512,861 M. FT.
CALIFORNIA
STAND OF TIMBER 340,064,483 M. FT.
254 MILLS
CUT 1,303,183 M. FT.
CAP. 2,175,348 M. FT.
ALL OTHER STATES
STAND OF TIMBER 306,200,000 M. FT.
10,211 MILLS
CUT 3,555,110 M. FT.
CAP. 18,391,706 M. FT.
LAKE STATES
STAND OF TIMBER 110,200,000 M. FT.
2,969 MILLS
CUT 3,917,688 M. FT.
CAP. 14,698,083 M. FT.
NORTHEASTERN STATES
STAND OF TIMBER 242,300,000 M. FT.
7,942 MILLS
CUT 3,305,476 M. FT.
CAP. 17,889,700 M. FT.
SOUTHERN PINE STATES
STAND OF TIMBER 644,300,000 M. FT.
16,927 MILLS
CUT 16,359,172 M. FT.
CAP. 50,668,396 M. FT.
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEVADA
UTAH
ARIZONA
NEW MEXICO
OKLAHOMA
TEXAS
IOWA
MISSOURI
ARK.
LOUISIANA
INDIANA
OHIO
PENNSYLVANIA
NEW JERSEY
WEST VIRGINIA
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
FLORIDA
ALASKA
SCALE
APRIL 1915

AGGREGATE FOR UNITED STATES
STAND OF TIMBER 2,800,167,193 M. FT.
NUMBER OF MILLS (1909) 42,041
CUT REPORTED IN 1914 37,346,023 M. FT.
CAPACITY OF 42,041 MILLS 117,488,656 M. FT.

NOTE:
THE NUMBER OF MILLS AND THEIR CAPACITY ARE BASED UPON CENSUS RETURNS FOR 1909; THE LUMBER CUT UPON RETURNS FOR 1914.

RELATION OF LUMBER CUT AND MILL CAPACITY TO STANDING TIMBER
FIGURE I.

The most common industrial unit combines the ownership of timber with logging and milling operations. On the other hand, vast areas of stumpage are owned by individuals or companies whose economic function is limited largely to holding the raw material and selling it from time to time to loggers or manufacturers.

While the average sawmill logs its own timber, there is, particularly on the West Coast, a distinct logging industry, owning stumpage of its own or buying from time to time and selling its logs to manufacturers. And similarly "log-buying" mills maintain no camps of their own, but buy raw material for manufacture in log markets like those on Puget Sound or the lower Columbia River.

There are similar diversities in the distribution of lumber. Probably the greater volume is delivered to retail yards, factories, or other large consumers by the manufacturer himself, acting as his own wholesaler. A great deal of lumber, however, is sold through agencies or independent wholesalers who buy from the mills and resell to distributors. Wholesalers may indeed buy lumber from each other to supply special classes of trade. Lumber may be stored at wholesale yards or transfer points as well as in retail yards. Freight may be paid on it from one to as many as five or six times. The final distribution again is largely through separately conducted retailing establishments. Many large consumers, however, like railroads and factories, buy direct from wholesalers or manufacturers; and considerable lumber is retailed through yards connected directly with mills and forming the last link in a lumber enterprise which may extend from the ownership of standing timber to the sale of its manufactured products to the final user.

Much of the lumber manufactured in the United States, however, passes through but two industrial organizations—the manufacturer, who combines stumpage ownership with logging, milling, and wholesaling, and the retailer, who takes the product from the mill and distributes it to the consumer.

RETURNS ON TIMBER INVESTMENTS.

The "ifs" in timber ownership in the West grow out of the vast extent of its forests, their distance from the large consuming regions, and their abnormal rise in value. Speculation in quantities of public timber, cheaply acquired, and the push of sudden development carried timber values very high. Borrowed money was used freely. Tax burdens rose with the price of stumpage. The interest and taxes paid out on timberlands held over long periods may thus mortgage liberal advances in future worth.

On the other hand market values of stumpage have stood still for eight or nine years, and even declined in 1915. Western timberlands have been overcapitalized more or less, and can hardly earn in the long run the profits expected of them. The large speculative gains in buying stumpage which have tided lumbermen over many tight places are mostly over. The future earnings of the industry probably will have to be made in its milling and merchandising.

Southern pine timberlands have traveled much the same road, but at a slower pace and with less striking results.

TIMBER OWNERSHIP, EAST AND WEST.

It is difficult for a resident of New England or Pennsylvania to understand the abnormal conditions in timber ownership in the Northwest. Forest properties, in his experience, have been relatively stable. Their valuation from period to period has in the main been conservative. There has been no great or sudden capitalization of timberlands, and no such rapid industrial development founded upon them as that which has taken place in several Western States.

With diversified markets close to the standing trees, eastern forests have yielded their owners a succession of salable products. Large areas culled over in the earlier days for white pine were later logged for spruce or hemlock. Balsam or hardwoods have often formed the marketable product of a third cutting. The demand for pulpwood or box lumber or fuel has enabled owners to recut their lands for material too small for use in earlier lumbering. In other words, the eastern forests have paid a revenue to their owners from time to time over a long period, which could be applied on taxes, interest, or the principal of the first investment. Recurring opportunities for income have wiped out accrued costs and greatly reduced and simplified the burden of carrying timberlands. Relatively low interest rates and fire hazard and moderate taxes, as compared with western conditions, have further eased the problems of the eastern forest owner. Because of these facts and the conservative temper of the country, forest lands have been moderately capitalized.

Another important difference is the much smaller extent of the forest resources of the Eastern States at any time since their active commercial use began in comparison with near-by population and demands for wood. This is brought out strikingly by the lumbering history of the Lake States. Large indeed as their virgin pine forests were, with an aggregate of probably 300 billion feet, it was a small resource in comparison with the enormous population and markets at its very doors, in the upper Mississippi Valley. Rapid utilization at high profits sustained a rapid increase in stumpage values. The bulk of the pine timber, the most valuable in the region, was worked out and realized upon within 40 years. Heavy losses from fire undoubtedly aided the appreciation in value of holdings which escaped. The success of many timber investments in the Lake States profoundly influenced the forest history of the West. Like profits were anticipated without, as now seems probable, sufficient allowance for the far greater quantities of timber, the longer holding periods involved, and the much greater cost of transporting lumber to any markets comparable to those available to lumbermen in Michigan and Minnesota.

The pineries of the South occupy an intermediate position between the forests of the North and those of the West in (1) their original timber resources and (2) their distance from large markets. Their returns have been in accord with this intermediate character. Exact comparisons will not hold because of the different quality and uses of the southern timber and the later development of its manufacture, involving keener competition with substitute materials. In the broad, however, southern pine has neither attained the values nor yielded the profits to its owners which were common in the Lake States; and, on the other hand, its ownership has not involved as serious problems of long-term investments as those which confront the lumber industry in the West.

DISPOSAL OF THE PUBLIC TIMBERLANDS.

Private forest holdings in the Lake States and the South were built up out of the public domain, mainly under the laws permitting cash sales or preemption at $1.25 per acre, the homestead law, the land grants to States, and grants made through the States to railroad companies.

Private ownership of timber in the far West likewise began with the acquisition of some 1,200 billion feet from the public domain. Since about 1860 the United States has parted with title to approximately 54,000,000 acres of commercial timberland in the States lying west of the one hundredth meridian. Over 11,000,000 acres of this amount were purchased under the timber and stone act at $2.50 per acre. Other vast quantities were obtained under the preemption and cash-sale acts at $1.25 per acre, the homestead laws, and the public-land grants to States and transportation enterprises. The grants of land of all classes to these States, including swamp lands and grants in aid of wagon roads, total 68,290,000 acres, and to railroad companies within them 78,689,000 acres. A considerable part of the timberlands included in the State grants have subsequently been acquired by private owners, and the enormous railroad grants have been a powerful factor in building up the larger holdings of the Northwest. Even after extensive transfers to lumber companies, the Northern Pacific and Southern Pacific Railroads controlled together 6,859,000 acres of timberland and 141 billion feet of stumpage in 1910.[1]

Many forces were behind this unparalleled transfer of natural resources from public to private ownership—the demand for quick settlement of the public lands and for aid in the economic development of new States, the speculative pressure in every new region, the push of lumbering, railroad, and other commercial interests, the "land hunger" which has been a powerful influence in every nation owning a public domain, and the western sense of local proprietorship toward the public lands which has viewed the Federal Government as a trustee charged solely with their distribution. It was indeed in keeping with the spirit of the times. It was part of the individualism which marked the commercial growth of the last quarter of the nineteenth century. Defective land laws and loose administration reflected the political pressure of all of these forces.

It is significant that private ownership of western timber is comparatively recent. In California, where it first developed, the transfer of public title was not well under way until the seventies; in western Washington and Oregon it was fully a decade later; and it was at least two decades later in the great interior basin of the Columbia River known as the Inland Empire. In other words, behind it was the example of profitable timber investments in the Lake States, the modern lumbering operation with its large sawmill requiring hundreds of millions of feet of stumpage, and the push of large amounts of capital made in lumbering and seeking reinvestment in kind.

The bulk of the public timberlands were disposed of under the mistaken and impracticable theory that they could be developed in small units like farm lands; a large part of them, indeed, were obtained under the identical laws designed to promote agricultural settlement. This was at total variance with the physical and economic requirements of the situation. The western forests, in regions of limited transportation facilities and distant from any considerable lumber market, had to be grouped in comparatively large holdings before exploitation was practicable. Yet before the creation of the National Forests there was no adequate law under which public timber could be obtained in the quantities required for manufacture under the industrial conditions in the far West.[1] Concentration of timber claims was impelled by economic laws, however at variance with statute law. It was often accomplished by fraudulent practices, largely sanctioned by the "public land" conceptions of the West and for a long time inadequately checked by Federal administration.

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[1] Report of the Bureau of Corporations, "The Lumber Industry," Pt. I.

The concentration of timberlands west of the Rocky Mountains reached its climax between 1907 and 1910. Its extent in the latter year may be summarized from the report of the Bureau of Corporations.[2] In the Northwest 20 owners of 5 billion feet or more each controlled, all told, 436 billion; 131 owners of 1 billion feet or more controlled 664 billion; and 313 owners of 250 million feet or more held, altogether, 757 billion. In the southern pine region 3 holdings of 5 billion feet or more comprised, together, 22 billion feet; 67 holdings of 1 billion feet or more aggregated 152 billion; and 307 holdings of 250 million feet or more had a combined total of 263 billion feet. About one-third of the private timber in the Northwest was in the hands of 8 companies. In the South, where concentration has been marked but there are fewer very large holdings, about one-sixth of the standing pine timber was found to be in the ownership of 29 companies. Beginning about 1905 and extending until 1910, there was a well-defined movement among yellow-pine manufacturers, impelled in part by an anticipated shortage of stumpage, to acquire timberland. The bulk of the yellow-pine stumpage was blocked up in large properties during this period.

It is evident that the acquisition of timberland went far beyond the requirements of practical exploitation and to a large extent took the form of speculations in stumpage.[3] The scale of speculative activities, growing out of the availability of public lands for less than they were worth, is the most striking feature of the whole movement. Speculative pressure to obtain public timber, indeed, has never relaxed.

Since 1910 the concentration of large holdings, particularly in the West, has been checked by the uncertain course of stumpage values. Some of the heaviest owners, indeed, have reduced their holdings by sales to loggers or manufacturers. Timber buying in many localities is restricted largely to tracts desired for manufacture. Even this has been set back by unfavorable market conditions and the general curtailment of lumber cut. Many public-land entrymen on the West Coast were unable to sell their claims in 1914 and 1915.

THE CAPITALIZATION OF WESTERN STUMPAGE.

The great bulk of the trillion feet or more of public timber acquired by private owners in the West cost the first patentees from the Government and the first purchasers of State and railroad grant lands from 3 to 25 cents per thousand board feet. With the development of lumbering, the construction of transcontinental railroads, expanding markets, and the influence of eastern conceptions of timber values, enhancement of stumpage prices was very rapid.

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[1] The act authorizing cash sales in unlimited amounts was repealed in 1889 and was relatively of little importance in the far West.

[2] Investigation of the Lumber Industry, Pt. I—Standing Timber.

[3] "Speculation" is used in this report not in the strict economic sense of any purchase of commodities in anticipation of an ultimate rise in value but with the colloquial meaning of buying for a quick turn rather than for manufacture or for an investment of long duration.

The 20 years prior to 1908, and particularly the period from 1900 to 1908, was the heyday of timber in the West. There was a rush of entrymen to the public timberlands, not to settle them, but to acquire salable claims. Millions of acres were patented from the Government every year. The agents of many lumber companies and eastern investors were busily engaged in buying claims and "blocking up" holdings. Local speculators assembled properties of a few thousand acres. Trading was active and hundreds of men made fortunes by buying and selling stumpage. Confidence in future timber values was unlimited. It was the common feeling that prices would go up—as far as in eastern lumbering regions—but could not come down. Within 10 or 15 years the initial cost of Government timber was multiplied in subsequent transfers—ten, fifteen, or twenty times in various parts of the Northwest.

It was during this period that the conservation movement took shape. The establishment of National Forests quickened the rush for claims by entrymen and agents of lumber companies who sought to acquire timber before the land could be withdrawn. The public reservations and discussions of future timber shortage were generally interpreted as pointing to higher values. Persons unfamiliar with the industry and less conservative than experienced timbermen were encouraged to invest in stumpage. Full advantage of the movement was taken by speculators and by some substantial companies in capitalizing their holdings for borrowing.

A concrete measure of the activity in acquiring public timber and running up its value is found in the present capitalization of stumpage in the Western States. It is questioned if any parallel exists of such enormous capitalization of a natural resource within scarcely more than three decades. The assessed value of private timberlands in California is now about $51,000,000; in western Oregon and Washington, $170,000,000, exclusive of the considerable quantities of stumpage on areas classed as "unimproved lands"; and in the Inland Empire, approximately $140,000,000; or, for the whole Northwest, $358,000,000. Considering the basis of assessment in the several regions and the going price of stumpage representing average quality and accessibility, the rated value of the private timberlands in California, Oregon, Washington, Idaho, and western Montana to-day is believed to be not far from $1,100,000,000.

Such rapid capitalization, in the nature of things, involved extensive use of borrowed money. Much of this was the conservative mortgaging of assets. Bodies of timber were often bonded to finance the construction of sawmills and logging railroads. The speculative side was reflected, however, in much unsound financing. Timber was mortgaged for all it would stand to provide funds for further purchases, and the process repeated with each new block acquired. Manufacturers often put their earnings largely into further timber purchases, when portions of them might perhaps have been better used to reduce indebtedness or improve their plants. The values at which timberlands were capitalized for borrowing purposes were sometimes excessive, an effort to realize in advance upon anticipated profits. The lenders share responsibility for these conditions. Many weak timber investors and manufacturers were financed by local banks. In truth, the business conservatism of the whole region seems to have been affected by the prevailing confidence in timber values and their future; and while a large part of the financing of timber holdings and sawmills was normal and necessary, the unsound was liberally mixed with the sound. These conditions represent, of course, but one phase of the optimistic and speculative spirit common in rapidly developing parts of the United States.

The early borrowings were largely in the form of short-term notes at the interest rates characteristic of new countries. These were lowered as timber financing developed on a larger and more permanent scale. About 1905 a special form of security appeared—the timber bond. Bonds were issued as first mortgages upon timber holdings and manufacturing plants, usually to be refunded serially by setting aside a stated sum from the proceeds of lumber sales. The common interest rate was 6 per cent, but expenses in issuing such securities and their usual sale below par often made the actual cost of the capital 7 per cent or more. Bonds—in series running for 10 or 15 years—formed a more stable form of borrowing than local notes, often at a reduced interest rate; but usually have the disadvantage of prescribing in advance the cut of lumber necessary to meet maturities regardless of the condition of the market.

A record was obtained of outstanding timber bonds in the Northwest in 1915 aggregating about $54,000,000. Other forms of borrowing are still common. An analysis of the financial statements of 30 manufacturing companies in California, including 5 entirely free from debt, indicates a total indebtedness of $26,169,382 in 1914, or $0.92 per thousand feet on their holdings. Similar figures from 34 mills in the Inland Empire, for 1914, show a total indebtedness of $18,382,888, or $0.90 per thousand on the 20 billion feet of standing timber owned by them. These debts are secured by manufacturing plants and current business as well as stumpage, but the proportionate share chargeable to standing timber is probably not less than 60 cents per thousand feet in each of these two regions.

The capitalization of timber was, broadly speaking, a slower and more normal process in the southern pine belt than in the Northwest. Large holdings were slower to develop. For a long period timber ownership was well distributed and many mills bought but small quantities of stumpage from time to time. About 1905, however, competitive timber buying began on a large scale and stumpage values went up rapidly. Many bond issues on southern pine operations were floated in connection with large timber purchases between 1905 and 1912.

Yellow-pine manufacturers have not been far behind their western competitors in the capitalization of their industry with borrowed funds. A record was obtained of timber bonds outstanding against 27 companies which aggregate $39,428,872. An analysis of 108 plants, including 10 free from debt, shows a total indebtedness of $52,629,210 in 1914, or $1.11 per thousand feet on their combined ownership of timber.

CARRYING CHARGES ON TIMBERLAND.

High valuation and interest on indebtedness form the key to the problem of timber ownership, the so-called "carrying charge." Few timber properties in the West and South yield any revenue until the clean cutting of all merchantable stumpage begins. Market and logging conditions have not permitted the early culling out of especially valuable products, like the white pine in northeastern forests, whose sale might wipe out accrued charges or return part of the first cost. Returns upon the investment in any piece of land come but once and all at once, and whatever is paid out for taxes, interest, or protection from fire must often be carried by the owner for decades, until his trees can be converted into lumber.

Interest on the first cost of timber investments at a rate not less than 6 per cent is commonly regarded by lumbermen as a carrying charge, or added cost, whose return is expected when the lumber is marketed. The initial investment may be wholly borrowed, in which case interest is actually paid and represents a yearly outlay added to the principal. To the extent that the investor's own funds are employed, interest obviously is not a cost, but an expected return. In fact, broadly viewed, all interest figured in carrying charges should be regarded as an expected return rather than a cost. The individual concern, from necessity or convenience, may have to pay out interest before reckoning its gains. In the business as a whole, however, particularly from the standpoint of the public, the distinction between owned and borrowed capital is not vital. Earnings in either event are returns, or profits, although partly used in one instance to carry a debt.

The proportion of borrowed money in timber investments is relatively high, at interest rates varying from 5 to 8 per cent. Six per cent on portions of the capital in use ranging from one-third to one-half in various sections of the West and South appears to represent the actual yearly charge for interest on debts carried in connection with timber and lumber manufacturing investments. The variation among lumber companies in the proportion of borrowed capital is especially striking. Every condition is met, from concerns wholly free from debt to mills operating on nearly 100 per cent of borrowed funds.

Six per cent is the lowest rate at which lumbermen have been able to borrow funds on any considerable scale. Hence the industry has come largely to rate its investments and capitalize its assets on this basis. It must be borne in mind, however, that any rate used as a carrying charge is in reality an expected return; indeed, wholly a net return in the case of operations free from debt.

Many timber owners compute their carrying charge at compound interest; that is, book the same returns upon their accrued interest as upon the first investment. Compound interest is the correct basis of finance, but in the nature of things permits the use of but low rates on long-term investments. Timber properties can not be expected to return compound interest over long periods at the rates hitherto prevailing. Scarcely any class of property could meet such a test.

Taxes and costs of fire protection, where incurred, are obvious carrying charges. Taxes in themselves form one of the most difficult problems in timber ownership. They not only call for recurring annual cash outlays, however income from the property may be delayed; they have usually increased from year to year, sometimes in proportion to increases in the price of stumpage but often regardless of changes in timber values. In many parts of the West taxes kept on increasing for several years after timberlands had reached their highest point. It is probably true, however, that during the last 15 years as a whole taxes have not more than kept pace with the increasing value of stumpage, and in some regions they have fallen behind.

The tax burden varies greatly in different forest regions. In the South as a whole it has never been a serious factor. The yearly taxes on large southern pine holdings vary enormously but appear to average about 1.7 cents per thousand feet, or from three-tenths to five-tenths of 1 per cent of their value. Timberland taxes in various California counties average about 5 mills per thousand feet. Taxes in the counties of western Washington and Oregon range from 0.25 cent to 3 cents per thousand feet. The annual timberland tax of Douglas fir owners aggregates $4,962,000, or nearly nine-tenths of a cent per thousand board feet on the average. The rate in the Inland Empire averages about 1.7 cents per thousand feet. These yearly levies are equivalent to from one-third to 1 per cent of the present value of timberlands.

It is improbable that the general property-tax system levies upon timberlands more than their just share of local revenue over any considerable forest areas. Unsuited by nature to this form of wealth, however, it tends toward heavier taxes than a sound forest industry can bear. Uncertainty as to the future extent of this burden is a menace to the stability of timber ownership.

Costs of fire protection, which has been admirably developed by private owners in much of the Northwest, add but little to the annual carrying charge. These costs, including such fire losses as may occur, rarely exceed one-tenth or one-fifth of a cent per thousand feet of stumpage yearly, although in northern Idaho fire protection has cost one-third of a cent per thousand feet.

The effects of carrying charges as western timber owners usually compute them can be illustrated by a typical West Coast quarter section, acquired under the timber and stone act in 1902 and carried through two different ownerships. The original costs were:

Locating fee	$125
Price paid the Government	400
Expenses of claimant, etc	70
Total	595

The land was cruised at 7,250,000 feet, making the first cost of the timber 8.2 cents per thousand. The original patentee carried this claim until 1907 and then sold it for $4,000. By this date simple interest on the first cost at 6 per cent amounted to $142.90, taxes to $105.88, and interest on tax payments to $8.64.

The book value at the time of sale thus amounted to $852.42, or 11.8 cents per thousand feet.

The purchaser's ledger down to 1915 reads as follows:

Purchase price, 1907	$4,000.00
Simple interest on above at 6 per cent	1,680.00
Taxes paid	940.07
Simple interest on tax payments	158.40
Paid for fire protection	28.40
Paid for cruising	15.00
Total	6,822.27

With carrying charges added, the purchase price of 55 cents per thousand feet in 1907 thus becomes 94 cents in 1915. The increasing taxes in this instance are somewhat typical of the region. Beginning at $26.88 in 1903 they reached $170.60 in 1914.

Broadly speaking, if protection costs and taxes be added to the investment and interest compounded at 6 per cent on each of these several outlays included, the capitalization of the property doubles every 8 to 10 years. Substantially the same result is obtained by compounding 7 per cent on the first cost annually to cover all charges and the expected return of 6 per cent. If simple interest only at 6 per cent is added to first cost and taxes, the capitalization doubles approximately in every 12 years. The interest rates prevailing during the earlier period of many of the present stumpage holdings exceeded 6 per cent, and prior to 1890 often reached 10 or 12 per cent.

It becomes apparent immediately that any timber, no matter how cheaply obtained, will acquire a high book value when the period during which it must be carried under such terms as these is measured by decades. Ten-cent stumpage obtained from the public lands in 1880 and carried at 6 per cent simple interest on first cost and current outlays for taxes and protection becomes 80-cent stumpage in 1916 and $3.20 stumpage in 1940. This sort of calculation pictures the conceptions behind the acquisition of forest resources in the West and to a considerable degree the business and financial conditions which have had to be met.

The real value of timber, on the other hand, is fixed in the long run by what is left after deducting operating costs from the price received for its manufactured products. This residue represents (1) the operator's profit and (2) the realized value of the raw material. As it expands or contracts, stumpage values tend to rise or fall. Such tendencies are usually offset more or less by speculative factors. Hence sudden drops in the lumber market have seldom been reflected in stumpage prices. Their normal movement is rather upward while lumber prices are advancing, and stationary during periods of depression. Timber values are thus fixed by the residue from operation only over broad periods. But this in the long run is necessarily the measure of the carrying charge which stumpage investments will stand, however it may be divided between taxes, interest, or what not. Hence the practice of booking stumpage at any assumed rate of profit rather than its actual cost is open to question.

Competitive forces will tend to restrict the supply of stumpage carried by a manufacturing plant to the amount necessary for its most efficient operation, including the depreciation of physical investments. The higher operating costs of mills which attempt to carry too much timberland will handicap them in holding their own in a competitive market. The experience of the industry appears to limit such holdings to a supply for not more than 20 years. For many plants it should be less. The cost of carrying larger quantities, held really for speculation rather than the needs of efficient operation, is not chargeable against the production of lumber, but should stand apart as an investment in itself on which anticipated profits are small and can be deferred. This principle has point in relation to the enormous surplus of stumpage in the West—beyond all manufacturing requirements for many years, which should form a national reserve for the future.

RETURNS TO STUMPAGE OWNERS.

The accompanying diagrams (figs. 2 and 3) represent (1) the general movement of stumpage values as reflected by current transfers in each of the four regions studied and (2) the usual capitalization of early purchases carried forward at the prevailing interest rates. The relations of these approaching curves are apparent. A rapid advance in values held everywhere until 1906 or 1907, and the wide margin between the two lines indicates the profits made by operators who sold or manufactured timber. Except in the yellow-pine region, there has been no advance in timber values since 1907, and the prices obtained in transfers during 1914 and 1915 show an average decline. Such transfers, it must be noted, represent but small amounts of timber, usually in the hands of hard-pressed owners who have been forced to sell. The bulk of the stumpage has been kept off of the market altogether, and is still valued at the prices obtained in 1912 and 1913.

These movements can be presented only in a broad way. Wide differences exist in each region in the situation of various operators who bought timber at different times and prices and have carried it for different periods. The broad conclusion is unavoidable, however, that to a varying degree in different regions and different cases the margin between the cost of cheaply bought stumpage and its current market value is narrowing. This condition is not limited to particular interest calculations or the methods of capitalization commonly used by the lumber industry. The returns on investments in standing timber, whether net to the owner or consumed in carrying borrowed capital, are decreasing.

This in a nutshell is one of the most significant changes in the lumber industry. Until 1908, returns upon timber investments were a large source of profit. Although dropping since that year with stationary stumpage values in most regions, returns on purchases of timberland have remained up to the present day the principal source of profit to lumbermen. During considerable periods of depressed markets profits on stumpage have been practically their only return. But the industry is approaching the point where its early stumpage costs will equal the market, or operating, value of the timber. That point, indeed, has been passed by many owners who bought timber during or after its rapid rise in value.

It thus seems probable that the lumber industry has in many instances overcapitalized its resource. It becomes doubtful whether the interest rates upon which much of its capital has been borrowed and its financial structure largely built up can, as economic conditions are now crystallizing, be returned by forest lands during long

periods. These returns may be realized on producing properties or on advantageous timber investments carried for short terms. They

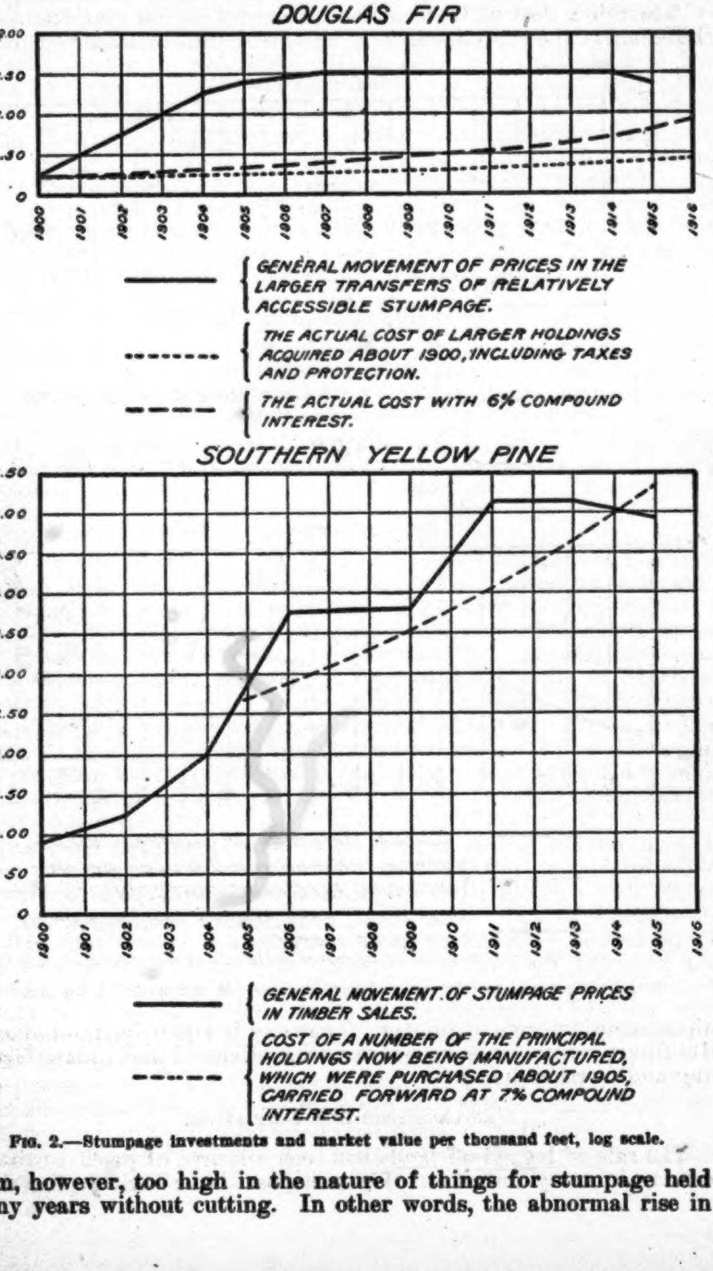
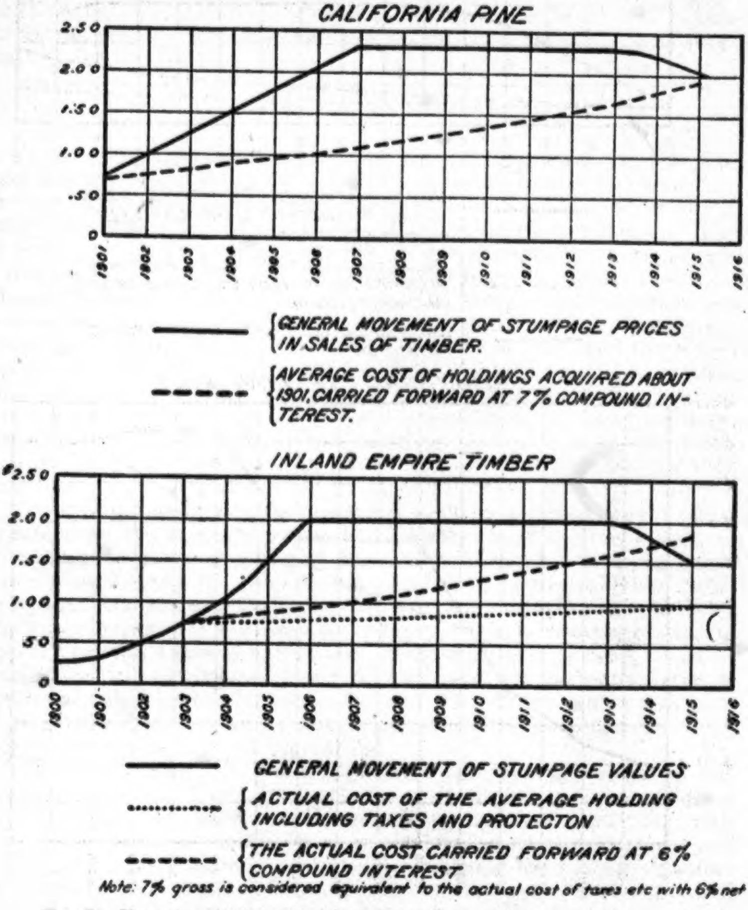


FIG. 2.—Stumpage investments and market value per thousand feet, log scale.

seem, however, too high in the nature of things for stumpage held many years without cutting. In other words, the abnormal rise in

stumpage values and the rapid development of the industry durin a brief period have led to what in many instances will prove a artificial and unsound capitalization of forest lands in the long run

There is a deal of truth in the oft-quoted saying that lumberme have made their profits largely as speculators in stumpage rathe


CALIFORNIA PINE

INLAND EMPIRE TIMBER

Note: 7% gross is considered equivalent to the actual cost of taxes etc with 6% net

FIG. 3.—Stumpage investments and market value per thousand feet, log scale.

than manufacturers of lumber. That day is going for the industry. Its future returns must be realized from efficient lumber manufacturing and merchandising.

RETURNS FROM LOGGED-OFF LANDS.

The sale of logged-off lands has been a source of profit to timber owners in many instances. Their disposal is so variable that it is impossible to estimate the amount of such returns. In agricultural districts considerable quantities have been sold for farming—usually at $10 to $25 per acre, occasionally as high as $100 or $200. Many large areas suited to agriculture after clearing are being held by lumber companies for speculation or because there is no immediate demand for them. Often such tracts have been purchased at low rates by farm-development or colonizing enterprises. Logged-off lands in mountainous regions, which are unfit for agriculture, have often been held by lumber companies with no clearly defined purpose. In portions of the West, particularly California, these mountain areas have been leased for summer sheep range. Tracts sold for this use bring from $2 to $3 per acre. In the Lake States and elsewhere large quantities of cut-over land of low value have reverted to the State for nonpayment of taxes. In the aggregate the returns to the industry from this source have not been great.

RETURNS IN LUMBER MANUFACTURE.

Ups and downs have been the portion of sawmills. Occasional years of high earnings have been followed usually by longer periods of small profits or losses—1914 and 1915 being the most extreme of these. Unstable lumber prices seem to show that the market has been overcut repeatedly.

It looks as though stumpage values were too high to afford a sound footing for the manufacturer. The economic laws which fix the value of timber in the long run by the value of its products now appear to be correcting this condition.

FLUCTUATING LUMBER PRICES.

The prices received for lumber at the mill in each of the four regions studied during periods of from 8 to 27 years prior to 1916 are indicated by comparative curves on the accompanying diagrams (figs. 4 and 5). The fluctuations reflect similar market conditions at the same time practically the country over. In general, 1906 and 1907 were years of high prices; then followed 4 years of comparatively low prices; a rising market for 12 months in 1912 and 1913; and a sharp and continued slump from the middle of 1913 until late in 1915. During 1916 lumber prices have traversed a complete cycle, approaching the 1912–13 levels in the early spring, depressed in midsummer, and again rising toward their former mark in September and October.

The most striking feature of these price curves is their fluctuation. Taking the years from 1907 to 1915, the average price of southern yellow pine shows a range of from $12.50 to $16.50, or 32 per cent of the lower rate. The average price of Douglas fir in the same period ranged from $9.60 to $15.20, a spread of 58 per cent of the lower rate. Taking the average price of the entire period as a base, yellow pine prices were under it during 5 out of the 9 years, in proportions ranging from 5 to 12 per cent. They exceeded it in 4 years by amounts ranging from 2 to 16 per cent. Similarly compared with the average during the whole period, the prices received for Douglas fir lumber have ranged from 28 per cent above this figure in 1907 to 9 per cent below it in 1911, 14 per cent below it in 1914, and 20 per cent below it in 1915.

These records from the two main producing regions bring out strikingly the instability of the lumber market. They also tell in a broad way the story of the returns in lumber manufacture—large profits during comparatively short periods, followed by long periods of low profits or loss.

The price movements have been somewhat different in California and the Inland Empire. Western pine and redwood are "specialty" rather than "all-purpose" timbers, like southern yellow pine and Douglas fir, and hence are subject to a somewhat more stable demand. All of them, however, reflect a variable market. Within the last eight years, for example, the average yearly redwood prices have ranged from $13.34 to $15.79, a difference of 18 per cent, and Cali-

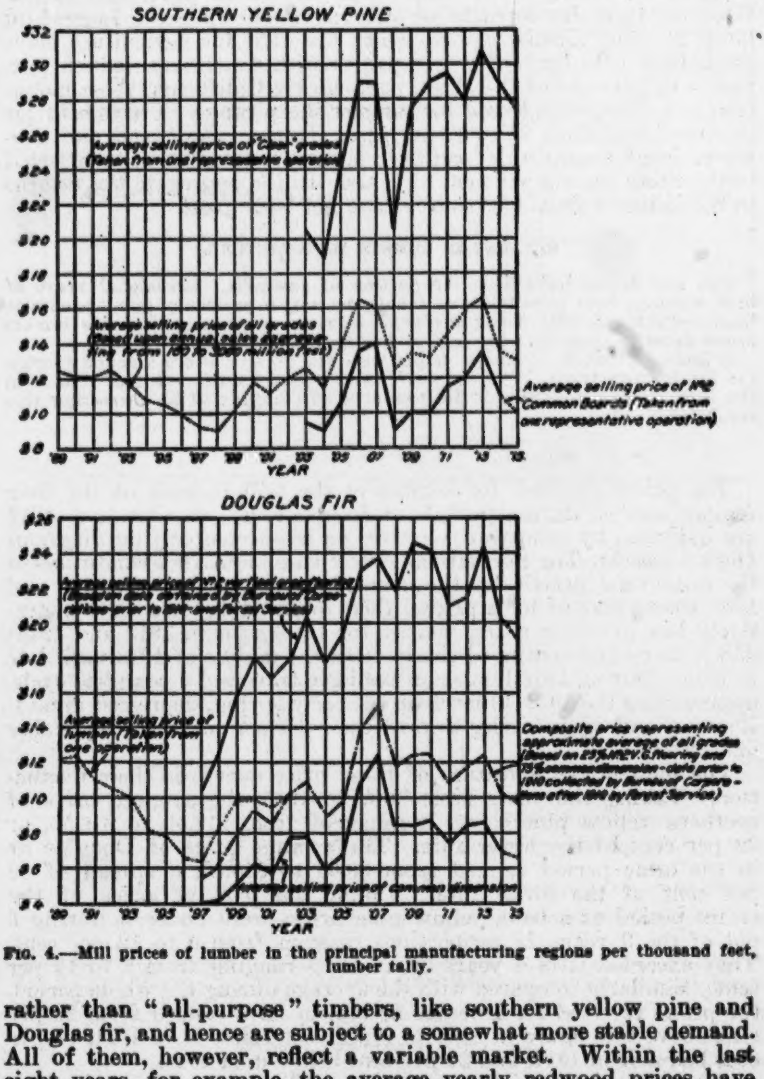


FIG. 4.—Mill prices of lumber in the principal manufacturing regions per thousand feet, lumber tally.

fornia pine prices from $14.34 to $16.12, a difference of 12 per cent of the lower rate.

Greater stability is reflected in the price movements of some other woods, like cypress, northern white pine, or white oak, which are

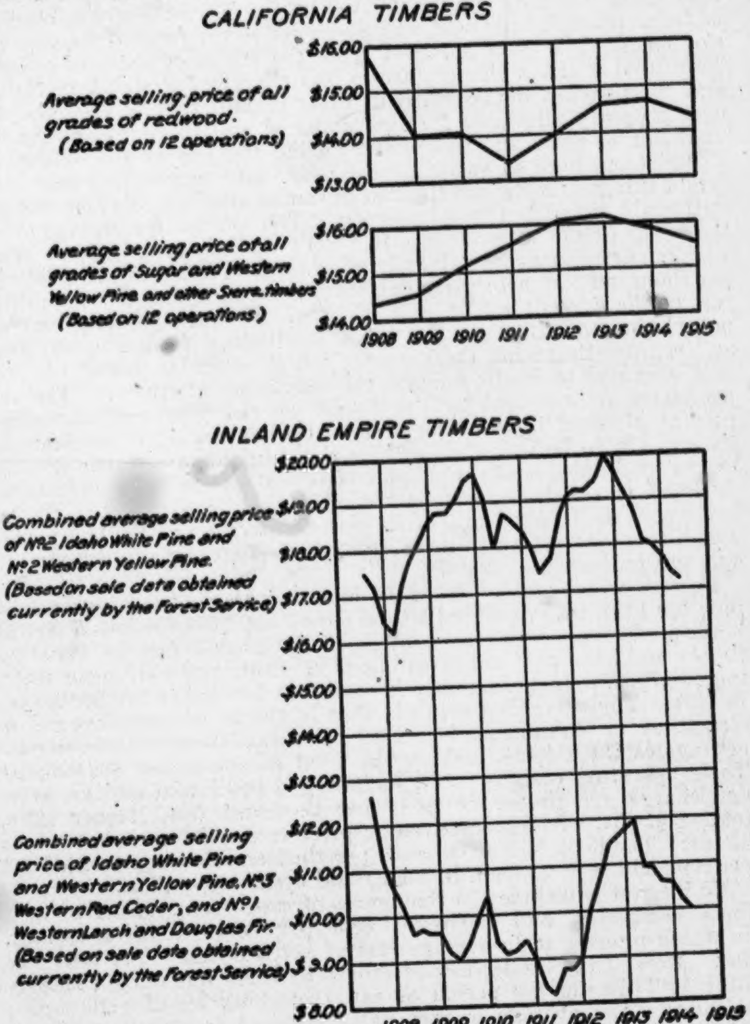


FIG. 5.—Mill prices of lumber in the principal manufacturing regions per thousand feet, lumber tally.

produced in limited quantities. This is due in part to the depletion of raw material, in part to the special markets which they serve, and in part, it would seem, to more effective cooperative selling or to greater financial strength in the manufacturing industry.

PROFITS AND LOSSES IN MANUFACTURING LUMBER.

To obtain as accurate information as practicable upon the profits and losses in lumber manufacture, the records of a number of operations in each of the four producing regions under investigation have been transcribed by representatives of the Forest Service, checked as far as possible, analyzed, and assembled in the form of a composite statement. The data obtained from the books of these companies were used without change, except the charges for standing timber and for physical depreciation of their plants; that is, the cost figures properly allowable for raw material and to pay back the investment in mills and equipment during the life of the operation. These items were so variously computed and represented such different things that the substitution of timber and depreciation charges uniformly calculated was necessary. The charge for stumpage on the books of the various manufacturers, for example, in some cases was its current market value; in others a low, uniform price like $1 per thousand feet, arbitrarily set but representing roughly the initial cost of the timber; and in still others an arbitrary amount, bearing no relation to either cost or value, fluctuating from year to year and representing what the operator felt it advisable out of his current earnings to credit against the purchases of timber. The depreciation figures used by the Forest Service represent either the present physical investments divided by the respective amounts of timber still to be manufactured or the original investment divided by the total amount of timber manufactured and to be manufactured during a reasonable operating life. Unless otherwise stated, timber is charged to the operation at its present market value. The profits which this may return in itself, upon the actual cost of such stumpage, are indicated separately.

Records were obtained from 108 manufacturers of southern yellow pine for 1914, who produced a total cut of 3,920,264,000 board feet of lumber. These operations control 47,429,426,000 feet of standing timber and have physical investments in plants and equipment totaling $36,761,986, including only investments devoted to lumber manufacture. Their working capital—that is, the money not invested in structures or equipment but used to carry current operations—aggregates $26,064,424, making the total capitalization $62,826,410. Their operating costs in 1914, including depreciation and an average charge for timber of $4.11 per thousand feet, lumber tally, totaled $14.54, whereas the average price received for their cut was $13.68. The book loss of 86 cents per thousand feet represented ~~5.8~~ per cent on the investment in plants and operating capital. 5.3

No interest is included in the figures of cost. As a matter of fact, these companies had borrowed 38.3 per cent of their capital, on which interest at an average rate of not less than 6 per cent was due. Most of the timber manufactured by them was bought shortly after 1905 during the period of rapid blocking up of yellow-pine holdings. The average market value credited to stumpage, $4.11, would return the first cost of this timber and simple interest thereon at about 9 per cent down to 1914 (7 per cent compounded annually). Probably 7.5 or 8 per cent is net, above current timber taxes and administrative costs for protection, legal work, etc.

In other words, these manufacturers cleared in 1914 7.5 or 8 per cent on the part of their total investment in timber which was utilized in that year, and lost 5.8 per cent on their operating investment of $62,826,410, aside from the interest paid on indebtedness. Their operating losses were partly offset by returns from other sources than sales of lumber—commissaries, rents, lath, shingles, heading, and other by-products. Data obtained from 19 operations, cutting 1,914,776,000 feet, show net returns from these sources averaging 54 cents per thousand feet of lumber cut.

Looking at the year's business from a different angle, the net return from lumber sales over all operating costs save raw material was $3.25. If 6 per cent is claimed as the earning of the operating investment, it would take 96 cents of this amount, leaving $2.29 for stumpage. Some of the timber manufactured in 1914 was purchased recently at rates ranging from $3.50 to $5 per thousand feet, lumber tally. The average tract bought around 1905 cost about $2.21 per thousand. On such holdings the residue for raw material obviously would not return the original cost with taxes and other current expenditures, wholly aside from interest. As pointed out previously, however, stumpage values are determined by this principle only in the long run; and the abnormal character of 1914 makes it reasonable to charge at least a portion of its losses to manufacture.

The year 1915 was no better than 1914 for manufacturers of southern yellow-pine lumber. General data obtained by the Forest Service indicate that the average profits on manufacture in that region were good in 1912 and 1913, amounting to something over $1.50 per thousand feet in the first year and $2 in the second; and low in 1911, with an average return of about 50 cents per thousand feet of lumber. The years 1908, 1909, and 1910 brought loss or low profit to the average operator in the southern pineries; 1906 and 1907, on the other hand, were years of high profits, exceeding $3 per thousand feet. These profits and losses are distinct from the returns on timber investments. The stumpage rate of $4.11 used in 1914 was reduced 7 per cent annually for the preceding years in these calculations, thus equalizing the gross return on the first cost of the timber cut each year at about 7 per cent compound interest.

Like composite statements cover the operations of 18 redwood manufacturers and 12 manufacturers of sugar and western yellow pine in California, also for the year 1914. The redwood operations represent 14,609,550,000 feet of standing timber and a cut of 493,757,000 feet in the year taken. Their investment in plants and working capital, for lumber manufacture only, aggregates $14,518,209. Their operating cost, including depreciation and the market value of the timber logged, averaging $2.07 per thousand feet, lumber tally, totaled $14.73. The average selling price of the lumber produced in these operations was $14.64 per thousand feet, representing a loss of 9 cents per thousand or 0.59 per cent on the capital in use. No interest is included in the operating cost, although actually due on 44.3 per cent of the capital which was borrowed in one form or another.

The stumpage cut by these operators represents a great variety of conditions—from timber purchased from patentees of public land 30 or 40 years ago at a few cents a thousand feet to transfers at a valuation of $3 or $4 within the last 6 years. A record was obtained of transfers at various periods aggregating 9 billion board feet. The cost of this timber, as compared with a market value in

1914 of $2.07, indicates a gross return on the investment of about 7 per cent compounded annually. Taxes, protection, and other current charges probably consumed from 0.5 to 1 per cent out of this yearly return.

The average redwood operation thus netted at least 6 per cent compound interest on the part of its timber which was cut in 1914, but lost 0.59 per cent on its manufacturing capital, aside from having to meet a heavy interest bill. A part of this loss was probably offset by returns from other investments—commissaries, tenements, shipping, etc. Leaving raw material out of the cost of operation, the returns would have paid 6 per cent on the manufacturing investment and left 22 cents per thousand feet for the timber; or 3 per cent on the manufacturing investment, with a residue of $1.10 to cover stumpage. The latter figure represents the first cost of the average tract of timberland purchased about 1903 or 1904.

Redwood has been sold largely in the local markets of California, and has not shared proportionately in the general waves of favorable prices. The years prior to 1914—back until 1908—were years of low or negative profits on manufacture, although paying returns on stumpage investments equivalent to those of 1914. The year 1915 was no better for redwood manufacturers than 1914.

The 12 California pine operations which were studied carry 13,760,000,000 feet of stumpage and cut 305,753,000 feet of lumber in 1914. Their manufacturing capital—in mills, railroads, and working funds—totals $10,222,526, of which approximately 46.9 per cent is borrowed. Their operating cost, including a timber value of $2.06 and plant depreciation but no interest, totaled $15.62, lumber tally, as against an average selling price of $16.06. These figures indicate an average profit of 44 cents per thousand feet or 1.5 per cent on the operating investment.

Stumpage costs in the California pine belt were obtained on transfers at various dates aggregating 6 billion feet. These costs, carried to 1914 at 7 per cent interest, compounded yearly, average $1.92, as compared with the current value used above of $2.06. Something less than 1 per cent annually would cover taxes and other current outlays. These operators thus appear to have returned the first cost with between 6 and 7 per cent compound interest, net, on the timber which was worked out in 1914; while realizing 1.5 per cent on their operating investment. Interest on borrowed funds had, of course, to be paid out of these returns.

The 1915 returns appear to have been somewhat less than those in 1914. Prior to 1914 the California pine manufacturers fared a little better than the redwood mills, due probably to the eastern market for their high-grade products developed by aggressive cooperative selling. Aside from profits on stumpage investments equal to those outlined above, however, the returns from manufacturing lumber appear to have been under $1 per thousand feet, on the average, in 1911, 1912, and 1913, and very low or negative in 1908 and 1909.

Similar data were obtained from 32 manufacturers of western yellow pine and Idaho white pine in the Inland Empire, covering the years from 1909 to 1914. They represent timber holdings of 19,755,000,000 board feet, an average yearly cut of 943,000,000 feet, and paid up capital stock aggregating $35,571,000. Their operating costs, exclusive of stumpage charges but including plant depreciation, have ranged in the 6 years under study from $10.97 to $12.79 per thousand feet; and their average selling price from $13.96 to $15.50. The actual outlay of these manufacturers for timber, covering purchase price, taxes, and protection but no interest, ranged from 85 cents per thousand feet in 1909 to 94 cents in 1914, log scale. If 6 per cent compound interest be added to actual outlay, the book charge for stumpage ranges from $1.18 to $1.70, log scale, in the respective years. The average market value of their timber in 1914, for immediate operation, was $2.44, although the book value charged to it on the accounts of the operators themselves was considerably more than this amount during the whole period. If the standing timber is credited with its actual cost with 6 per cent compound interest down to the time of cutting, the profits from manufacture, in amounts per thousand and percentages on operating investment, were as follows for the several years:

	1909	1910	1911	1912	1913	1914
Profit per M feet of lumber[1]	$2.76	$2.64	$1.70	$0.34	$1.06	$1.30
Percentage returned on operating investment	13.5	11.3	8.1	7.0	5.8	3.3

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[1] The irregular movement of profits per M feet in comparison with the per cent earned on investment is due (1) to an increase in the amount of capital in proportion to lumber output; (2) to variations in the returns from other enterprises than lumber manufacture; and (3) to variations in the grades of lumber sold and inventoried in stock at the end of the year respectively. The profit per M feet is based upon the average price received for lumber sold, whereas the per cent returned on investment includes the value of stock on hand at the end of the year. Heavy sales of low grades in 1912 reduced the average receipts for that year, while the higher grades carried in the inventory affected the calculated earning on the investment and raised the average price of the stock shipped the following year.

The returns in 1914 over costs of production other than the raw material would have paid 5 per cent on the operating investment and left a residue of about 94 cents per thousand feet for stumpage. This is equivalent to the first cost of the average timber cut in that year with the taxes and protection charges paid on it.

Out of these returns, 34 companies from which data were obtained for 1914 had to pay interest on approximately 33 per cent of borrowed capital at an average rate of 6 per cent, or about $1.03 per thousand feet on their cut. The Inland Empire has occupied a better position than most of the western lumber-producing regions on account largely of the special markets served by its soft-pine products; but the decrease in its returns from year to year is noticeable.

A detailed study was also made of the business of 15 Douglas fir mills in western Oregon and Washington for the year 1913, which was selected as representing reasonably normal prices for the lumber industry on the West Coast. Five of these were log-buying mills; the others complete logging and manufacturing operations. Access to the records of many other manufacturers for 1913 and other years made it possible to check these data and safeguard the conclusions drawn.

Lumber manufacture in 1913 netted some profit to the majority of Douglas fir operators above the market value of timber, which averaged about $1.50 per thousand feet. On a number of early purchases of stumpage, this represented a profit of about 6 per cent compounded. Fifteen per cent on the operating investment was the largest return found. Some companies, however, of good general standing either lost on the year's run or closed down during the last few months because they could not operate at a profit on the prices prevailing. A composite statement for eight plants shows an earning of $162,175 on $4,063,000 invested in mills, logging equipment, and working capital, or almost 4 per cent aside from a return of the cost of stumpage with 6 per cent. Five of these mills made a profit during the year, and two incurred a loss. Among log-buying mills, $2 per thousand feet, lumber tally, was the highest profit learned of, and some profit was earned generally; but occasional plants lost nearly as much as others gained.

A contrast is found in the conditions during 1914 and 1915. Lumber production was 20 per cent under that of 1913 and prices shrank so heavily that, regionally considered, lumber was sold at less than cost of production.[1] Operators of exceptional ability or location made a small profit; others lost money or incurred the cost of shut-downs. Numerous concerns about worked out their stumpage cost with 6 per cent thereon, without profit on their operating capital and without earning interest on borrowed funds invested in manufacturing.

For about four years prior to 1912, which like 1913 was a reasonably good year for Douglas fir manufacturers, the returns to the lumber industry in this region were very moderate; 1906 and 1907, on the other hand, were years of generally high profits.

The condition of small mills on the West Coast with a daily capacity of less than 50,000 feet is a matter of special interest. Less able than the better managed and more economical large plants to survive continued depression, many of these mills have been driven to the wall during late years. A canvass of 18 small mills in one district, in the middle of 1915, showed 1 solvent and operating, 2 solvent and shut down, and the rest in all stages of failure.

Obviously no exact accuracy can be claimed for the foregoing analysis of returns in manufacturing lumber; nor is its purpose to attempt any precise computation of profits and losses. Particularly was it impossible to sift out mismanagement, bad financing, or overcapitalization from the effects of general industrial conditions. This statement is rather to bring out the instability of the lumber market, the frequent periods of low profit or loss on manufacture by itself, and the saving feature in past bad times of cheaply acquired stumpage. Many lumbermen have weathered depressions by living on their timber.

Whether such losses as those common in 1914 are charged against timber or manufacture is immaterial. Obviously, however, continued lumber prices at the 1914 and 1915 levels would sooner or later reduce the value of stumpage.[2] A downward tendency in fact was reflected in nearly every region in 1915. The impression is easily gained that timber values generally have reached figures too high for soundness in the manufacturing business.

This indicates the dominating place held by timber ownership in the industry. Mills have frequently been operated at a loss, reckoning stumpage at its going value, because manufacture was simply a means of "cashing in" on investments in timberland. The productive business of lumbering has been weakened by this subsidiary relationship. From the standpoint of efficient manufacture, for example, the large quantities of stumpage held by the two groups of mills in California, sufficient for 29 and 45 years' run respectively, may be an element of weakness rather than of strength.

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[1] By this term, often used loosely, is meant the actual cost of production, including taxes and other real timber costs, but no interest on any part of the investment.

[2] This would, of course, be offset by developing products which utilized the same raw material or raw material now wasted more profitably.

In many of these features lumbering reflects tendencies common to other American industries. Its price waves follow the general periods of prosperity and depression which have affected the returns on nearly all manufactures in the United States.[1] The upset conditions in the lumber industry are thus related in part to general economic weaknesses of the country, its tendencies toward overdevelopment, the variable volume of its currency, and its alternation of years of inflation and excessive activity with periods of abnormal contraction. The conditions peculiar to lumbering are those arising from the nature and ownership of its raw material and changes in the relative demand for its products. The industry experienced in 1914 and 1915 the cumulative effect of these forces and changes, which had been gathering weight for 8 or 10 years.

Since late in 1915 a cycle of lumber price fluctuations has reflected alternate curtailment and overproduction. On November 1, 1916, the market was relatively strong. It would be fruitless to predict the duration of this favorable period. But with all the forces making for overproduction at work, indeed stimulated by any upward turn, its basis is insecure. Special demands for lumber abroad at the end of the European war may prolong this favorable market period or cause another upward wave later on, but sooner or later conditions more or less similar to those in 1914 and 1915 may return. A like reaction has followed on the heels of every other prosperous period in lumber manufacture during recent years.

RETURNS IN LUMBER DISTRIBUTION.

The charge for wholesaling lumber appears to range from about 50 to 90 cents per thousand feet. It is lower on stock sold directly by the manufacturers than on material marketed through a middleman. The latter levies a profit of 25 or 50 cents a thousand, but fills a necessary place in marketing the cut of many small mills.

Retailing lumber in the Middle West costs from $4 to $5 per thousand feet and nets a dealer's profit of from 75 cents to $3. The returns are higher in the country than the city and somewhat better all around than those earned in manufacture.

Farmers' cooperative yards report the lowest returns and correspondingly low prices. The volume of business handled, however, is one of the most important factors in the cost of distribution.

As indicated on page 9, great variation exists in the number of times lumber is handled between the mill and the consumer. For the great bulk of the trade, however, distribution can be reduced to three factors—transportation, wholesaling, and retailing. Transportation as an element in the cost of lumber is discussed in the following chapter. The costs and returns in wholesaling and retailing, as developed in a study of 11 of the Central States, are summarized here.

RETURNS IN LUMBER WHOLESALING.

There has been a marked tendency in recent years to increase the sales of lumber from the sawmill direct to the large consumer or retail yard. Manufacturers have been able, by developing their own selling organizations, to place an increasingly large proportion of their cut in this market without the services of the wholesaler. The practice in this regard is still variable. Sixty per cent of the output of southern pine lumber is sold direct, chiefly by large mills, to retailers, railroads, and factories. On the West Coast, on the other hand, but 20 per cent of the cut is marketed in this way. Another 20 per cent, during the last few years, has been sold through manufacturers' agencies and about 60 per cent through wholesalers and commission brokers. Data obtained from 21 large railroads show that 78 per cent of the lumber required by them is bought directly from sawmills, and from 17 to 21 per cent from wholesale dealers. Similar records from 132 wood-using factories indicate that 60 per cent of their material is obtained directly from manufacturers; and the purchases of 549 retail establishments, both individual and line yards, from sawmills directly aggregate 80 per cent of the lumber handled by them.

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[1] This is illustrated by the chart on p. 46.

The lumber wholesaler, however, has a necessary and valuable place in the trade. Over 95 per cent of the sawmills of the country, producing nearly 40 per cent of the lumber cut, are of comparatively small size, manufacturing less than 10,000,000 feet annually. A majority of these plants are unable to maintain their own selling organizations; and, except as they supply local trade, must rely largely upon selling agencies or wholesalers to market their lumber. Wholesalers also have held their ground in many cases because their efficiency and established position have made it to the advantage of the manufacturer to deal with them or because their trade connections controlled a market which the manufacturer could not reach.

The cost of wholesaling lumber at the manufacturing plant appears to average between 50 and 60 cents per thousand feet, the principal items being the salary and expenses of traveling salesmen, the maintenance of a sales office with its manager, and commissions. Selling lumber through commission brokers and jobbers costs the sawmill normally from 30 to 40 cents per thousand feet. Many mills market but a comparatively small volume in this way, and dispose of the bulk of their cut through their own selling offices. Mills sell lumber to wholesalers at a reduction of from 50 cents to $1.50 below the current market price, the greater reduction being made on the more valuable grades.

Sawmills seldom separate returns in lumber wholesaling from those in manufacture. Lumber sales affect the business either through the greater cost incurred by the mill itself, with a corresponding, or perhaps more than equivalent, increase in the price received, or through reduced returns on lumber delivered to wholesalers, with a corresponding reduction in operating charges. The increase in cost or reduction in returns, according to the method employed, averages between 60 cents and $1 per thousand feet.

Data were obtained, on the other hand, from 36 annual operations of lumber wholesalers in Kansas City, St. Louis, Chicago, and Minneapolis, covering business from 1908 to 1915, inclusive. The aggregate yearly volume of sales upon which these figures are based ranges from 66,356,000 board feet in 1913 to 150,909,000 feet in 1909. The average gross profit upon which these companies operated varied from 98 cents to $1.17 per thousand feet in the various years, or from 4.2 to 5.4 per cent on their sales. The average operating cost, by years, ranged similarly from 75 to 86 cents per thousand feet, leaving a net profit of from 18 to 38 cents per thousand, or from 1 to 1.7 per cent on the lumber sales. The returns of individual companies range from a net loss of 1.1 per cent on the sales to a net gain of 4.2 per cent. The average price received for lumber by these wholesalers during the eight-year period was $23.94 per thousand feet, and the average freight paid on their shipments from the mills, $6.78, or 28 per cent of the selling price.

RETURNS IN LUMBER RETAILING.

The 11 Middle Western States where lumber distribution was studied contain approximately 11,000 retail yards. Their annual volume of business is estimated to be 7,067,751,000 board feet, probably 95 per cent of the total retail consumption of lumber in this region.

The essential facts about the operations of various groups of retailers in these States are given in the following tables, based upon the business transacted from 1912 to 1915, inclusive. The operating expenses include a reasonable salary, commensurate with the general scale throughout the trade, for the owner or executive in charge of the yard, the depreciation of buildings and other property used in the business but not of lumber stocks on hand, repairs and renewals, and bad accounts prorated over the volume of lumber handled. Interest on borrowed funds is, however, excluded. Where a number of line yards are maintained by a single company the expense of the central office has been prorated over the total volume of lumber handled and included in the operating costs of the average yard.

These calculations are based (1) upon the investments found at retail yards, although partly required in many cases for distributing other products than lumber, and (2) upon the operating costs for handling lumber alone. Where other goods were carried by the same dealers the current expenses chargeable to lumber were segregated in accordance with the proportion of lumber sales to the total, dollar for dollar.

Costs and returns in lumber retailing in city yards.

Group of yards.	Average investment per yard.	Average selling price per M feet.	Gross profit per M feet.	Operating expense per M feet.	Net profit per M feet.	Net profit in per cent on investment.	Annual volume of lumber handled per yard.
						Per cent.	*M feet.*
22 annual yard operations in Chicago (8 dealers)	$194,281.46	$27.15	$5.90	$4.73	$1.17	7.31	12.148
49 annual yard operations in Minneapolis (17 dealers)	58,913.40	26.77	5.85	4.90	.95	5.99	3,653
24 annual yard operations in Kansas City (8 dealers)	104,465.36	25.41	5.65	4.48	1.17	6	5,348
Average of 95 annual yard operations	119,220.07	26.44	5.80	4.70	1.10	6.69	7,105

On the volume of sales, the gross operating profit averaged 21.9 per cent and the net profit 4.16 per cent.

Costs and returns in lumber retailing in country line yards operated by larg companies.

Group of yards.[1]	Average investment per yard.	Average selling price per M feet.	Gross profit per M feet.	Operating expense per M feet.	Net profit per M feet.	Net profit in per cent on investment.	Annual volume of lumbe handled per yar
						Per cent.	*M feet.*
1,270 annual yard operations in Minnesota, North Dakota, and South Dakota (5-9 companies, 202-374 yards)	$22,397.37	$31.24	$7.25	$4.24	$3.01	12.53	9
1,000 annual yard operations in Missouri, Kansas, and Oklahoma (8-11 companies, 202-356 yards)	20,610.59	29.73	7.07	4.99	2.08	7.43	7
173 annual yard operations in Iowa and Nebraska (2-4 companies, 22-83 yards)	21,915.63	31.29	7.17	4.33	2.84	11.9	9
Average of 2,443 annual yard operations	21,641.20	30.75	7.15	4.50	2.65	10.7	9

[1] The lower figures give the number of companies and yards from which data were obtained for th different years.

On the volume of sales, the gross operating profit averaged 23.2 per cent and the net profit 8.71 per cent.

Returns were obtained also from 88 town and country yards operated by independent retailers, on the business transacted in 1914 These yards averaged $47,177 in the volume of annual sales. Thei gross profit ranged from 12 to 40 per cent of the volume of sale averaging 20.17 per cent. Their operating expenses centered betwee 12 and 15 per cent, and their net profit averaged 7.31 per cent. Thi was equivalent to 7.46 per cent on the reported investment.

Inquiries were also sent to over 3,000 farmers' stock or cooperativ companies in the Middle West. The replies indicate that about 1 per cent of these companies, which enroll 400,000 members in the 11 States where the investigation was conducted, handle lumber. I the case of companies not engaged in handling grain, the gross profi on annual sales of lumber, averaging $52,000 per company, centere between 12 and 15 per cent. Where lumber was merged with grain the gross profit on an average annual business of $206,000 per company ranged from 3.16 to 10.89 per cent. In lumber sales only it wa found that these companies aimed at a margin of from 15 to 20 pe cent on wagon trade and from 10 to 15 per cent on estimates and bil sales. The operating costs ranged from 2 to 6 per cent of the sales in the case of companies handling grain, and, on the reports received, appeared to be close to 10 per cent with companies handling only lumber and building supplies. The net profit ranged from 5.7 to 15.1 per cent on the investment in the first instance, averaging around 1 per cent; and from 2.8 to 5.3 per cent in the second class of companies, with one concern reporting 6.8 per cent.

For the great bulk of the trade at the yards studied, therefore, th cost of retailing lumber ranges from $4 to $5 per thousand feet, exclusive of a profit of from 75 cents to $3. The returns in this branch of the business range in the majority of cases from 6 to 12.5 per cent on the money invested. The average profit of city retailers appears to be between 6.5 and 7 per cent, and of country retailers, aside from farmers' cooperative yards, between 7.5 and 11 per cent on their investment.

An important factor entering into these costs is the volume of lumber handled. Data based upon a large number of annual yard operations in towns of a population of 2,500 or less indicate that the actual cost of merchandising averages 11 or 12 per cent when the yearly sales aggregate $40,000, and rises to 23 per cent when the annual sales drop to $10,000 or less. The larger volume of business can be transacted at a cost of about $3.60 per thousand feet, whereas the cost of handling the smaller volume amounts to about $7. This difference arises, of course, from the fixed charges for salaries, rent, etc., incident to maintaining a retailing establishment. The number of retailers in the smaller towns, which consume over half of the lumber distributed through retail yards in the region studied, is thus an important factor in the cost of serving the public.

Broadly viewed the returns in lumber distribution thus appear to average higher and to be more stable than those in lumber manufacture.

THE COST OF LUMBER TO CONSUMERS.

Why has the cost of lumber gone up?

Retail prices at the larger towns in the Middle West usually follow the ups and downs in mill prices and often vary considerably in the same place. Prices are higher in the country, partly at least with good reason, and rise or fall more from local competitive conditions than the influence of the general market.

A fifth or more of the cost of lumber to consumers is eaten up in railroad freights; retailers take about the same amount; and manufacturers, on the average, little more than one-half. Rising costs of transportation as timber shortage has moved the mills farther and farther from the bulk of consumers is an important factor in the increasing cost of lumber. Other causes lie in the greater demands made upon the retailer by the public, in higher labor costs, and in the decreasing purchasing power of money. At that, the rise in lumber prices, though very marked during the 10 years before 1908, has not been greatly different from that of most commodities; and since 1907 lumber has fallen behind.

The immediate interest of the consuming public in lumber is the price paid for it. Prior to 1908 there was a general advance in lumber prices. The belief became common that lumber cost too much; that its rising price represented more than normal industrial changes and was influenced by combinations in restraint of trade. This belief was strengthened by the disclosure, through public agencies, of practices on the part of lumber manufacturers and distributors which sought or implied the maintenance of prices and other restrictions upon competition. The attitude of the average man toward the industry and in part toward the forest problems of the country has been influenced by this feeling regarding lumber prices.

One of the most important functions of a study of the situation, therefore, is to throw such light as may be possible upon the rising cost of lumber to its users.

RETAIL LUMBER PRICES.

The diagrams (figs. 6, 7, 8, and 9) show the movement of retail prices of various species and grades of lumber from 1912 to 1914, at Chicago, Minneapolis, Kansas City, and small towns in Nebraska and Colorado. These diagrams are based upon actual sales, segregated by grades from the records of retail dealers; not upon list prices, which were found to be unreliable. Prices and other factors in lumber retailing are so diverse that great caution is necessary in drawing broad conclusions from a limited amount of data. These curves illustrate, however, conditions found to be somewhat general in the 11 States where lumber distribution was studied. In the cases most commonly met, retail prices follow mill and wholesale prices closely, keeping from $4 to $8 above the latter. The records examined showed that while the list rates of different dealers at the same point may be approximately the same, the prices actually received, based upon the monthly sales of a given grade, varied from $1 to $3 or more per thousand feet, particularly in the larger distributing centers.

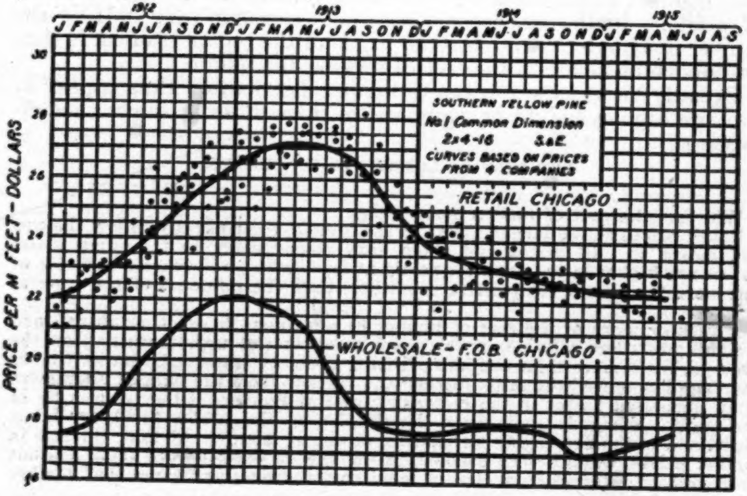

FIG. 6.—Course of retail prices, Chicago, in relation to wholesale prices.

In other cases, as illustrated by the prices of Douglas fir flooring at Minneapolis, the retail curve does not fluctuate to the same degree as the curve of wholesale prices, sharing but part of the downward movements of the latter. In still other cases, of which the diagrams of prices at one-yard and two-yard towns in Nebraska and Colorado are examples, the relation between retail and wholesale rates is much less marked and the fluctuations in retail prices appear to be governed by different causes. These are often traceable to local competition, between yards in adjoining towns or between a retailer of the customary type and a near-by farmers' cooperative yard. In some instances, indeed, lumber prices are very stable, indicating either lack of competition or that competitive prices have settled at fixed levels.

Broadly speaking, however, it seems probable that the bulk of the consumers in the 11 States where the investigation was conducted have obtained cheaper lumber by reason of the downward fluctuations in wholesale prices, particularly during the general decline since 1913. Average retail prices, by years, covering the entire stock sold are not strictly comparable on account of varying factors of transportation cost, proportion of species and grades handled, and the like. Such averages, however, which are summarized here for

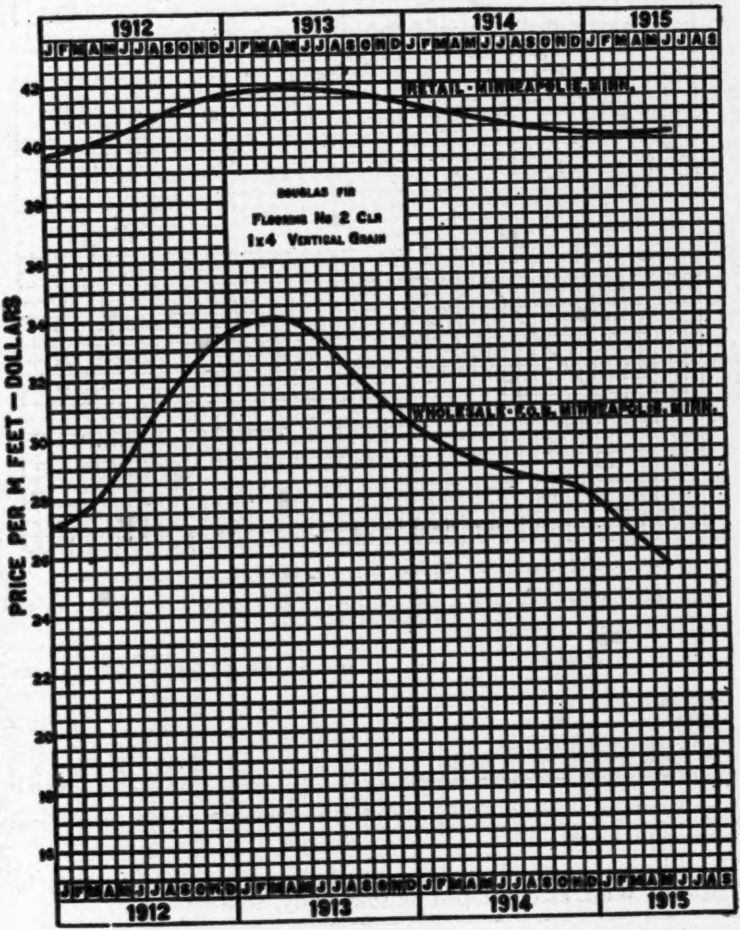

FIG. 7.—Course of retail prices, Minneapolis, Minn., in relation to wholesale prices.

the yards whose records were obtained, indicate in a general way the response of retail prices to manufacturing conditions.

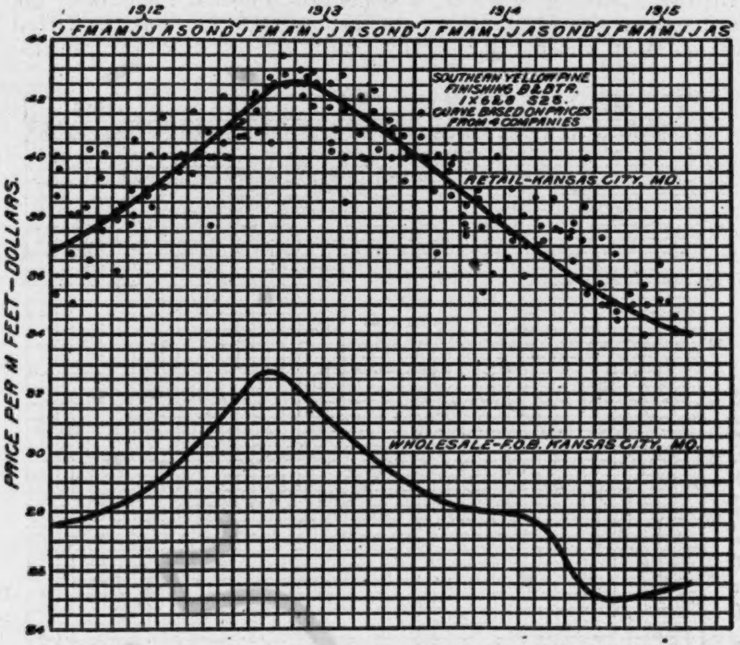

FIG. 8.—Course of retail prices, Kansas City, Mo., in relation to wholesale prices.

Average retail prices, by years, for all species and grades of lumber in the Middle West.[1]

Locality.	1912	1913	1914	1915	Average.
Chicago	$25.40	$28.93	$24.50		$27.15
Minneapolis	24.93	28.17	26.30		26.77
Kansas City	24.50	27.13	24.77		25.41
Country yards in Nebraska and Iowa	31.45	31.98	31.53	$30.54	31.36
Country yards in Minnesota and the Dakotas	30.89	31.74	31.76	30.58	31.24
Country yards in Kansas, Missouri, and Oklahoma					[2] 29.73

[1] Based upon the retail operations studied. The bulk of the sales were of softwoods, but the average prices include a small percentage of hardwood lumber.

[2] Average for 1912 and 1913 only.

The essential facts about lumber retailing from 1912 to 1914 in the Middle West, as developed by this study, follow:

Locality.	Average cost of lumber to dealers, per M feet.	Gross profit realized by dealers, per M feet.	Average selling price, per M feet.
Chicago	$21.05	$6.10	$27.15
Kansas City	19.76	5.65	25.41
Minneapolis	21.13	5.64	26.77
Minnesota and the Dakotas	23.99	7.25	31.24
Nebraska and Iowa	24.93	6.43	31.36
Missouri, Kansas, and Oklahoma	22.66	7.07	29.73

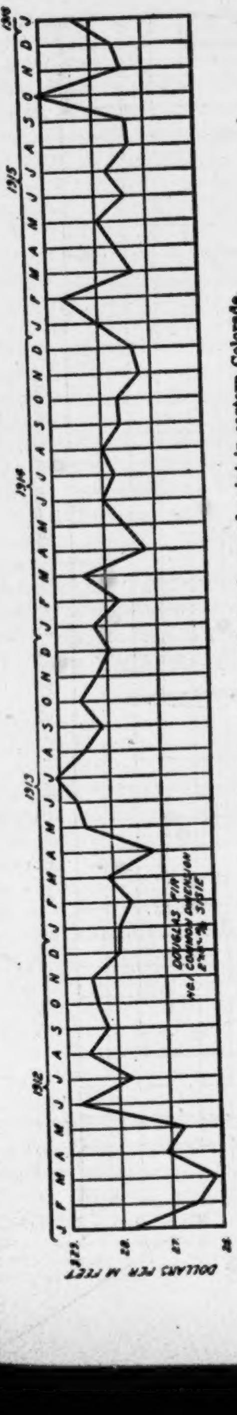

FIG. 9a.—Course of retail prices at one yard at a two-yard point in eastern Colorado.

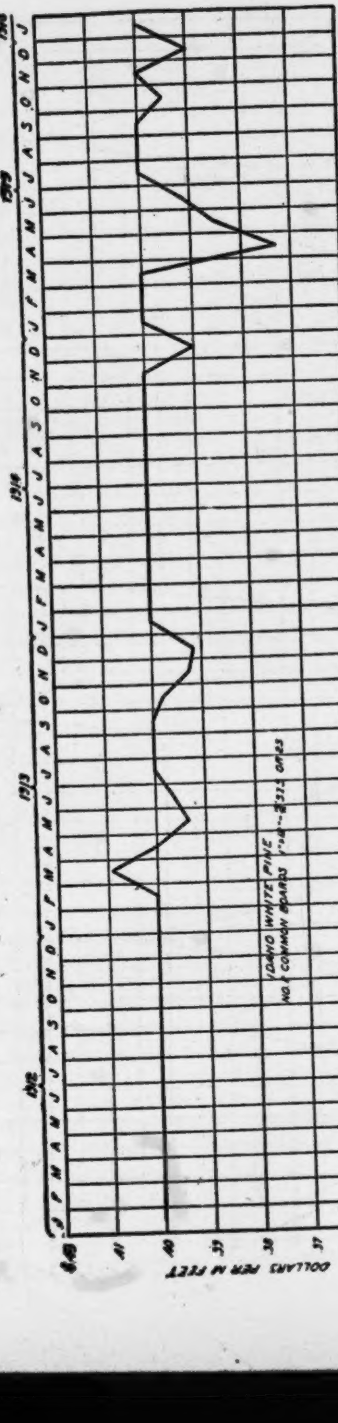

FIG. 9b.—Course of retail prices at a one-yard point in Nebraska.

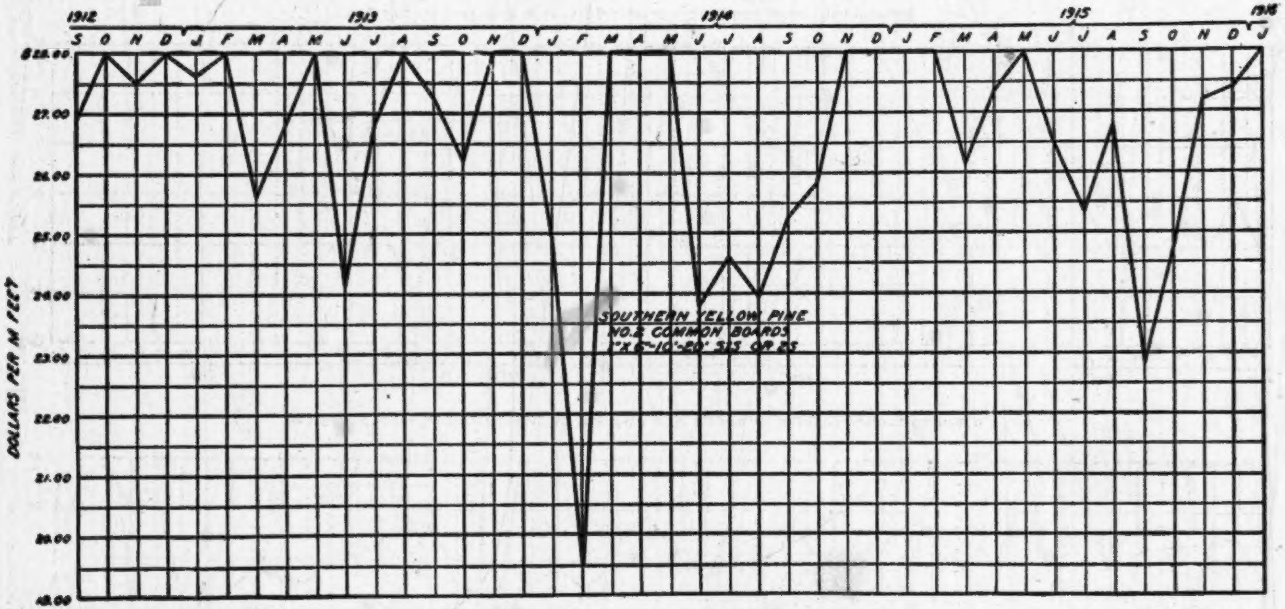

FIG. 9c.—Course of retail prices at a one-yard point in Nebraska.

A comparison of the average prices obtained by city and country dealers shows that the latter received from $2.50 to $4 more per thousand feet than the yards supplying city trade. This is due in part to the higher average cost of the lumber handled by country retailers, arising from heavier transportation charges and the higher quality of stock carried by them, and in part to higher gross profits. The latter is undoubtedly influenced somewhat by the greater cost of retailing small volumes of lumber and by the larger proportion of small orders. There seems to be no question, however, as pointed out on page 33, that the country trade in this region yields a higher net profit than the city trade. The price changes from year to year, although all reflecting the high mark of 1913, are also less sharp at the country than at city yards.

That the farmer pays more for lumber than the city man is borne out by a comparison of the rates obtained in towns having a population of 500 or less but with two or more lumber yards and similar points carrying but one yard. Figures obtained from 55 annual yard operations at the former and 24 at the latter, covering the period from 1912 to 1915, indicate that an average price of $31.04 per thousand feet is received by dealers at points having two or more yards, as compared with $32.70 at one-yard points.

This difference results from many factors, varying at different points and seldom uniform over wide areas. Restricted competition in many classes of country trade is unquestionably one of them, as well as higher operating expenses and often a higher cost of stock. There is no question that, by and large, country consumers in this region pay more for their lumber than city consumers, as indeed they do for other commodities.

WHAT BECOMES OF THE RETAIL PRICE.

The next point of interest is the distribution of the money paid by the consumer for the average thousand feet of softwood lumber among the various agencies which share in its manufacture and distribution. The division of the average retail price in the Middle West between manufacturer, wholesaler, railroad,[1] and retailer is shown in the diagram (fig. 10). From the average thousand feet sold through city yards, bringing $26.44, the manufacturer received $13.95, the wholesaler $0.92, transportation companies $5.77, and the retail dealer $5.80. From the average price paid to country line yards, $30.75, the manufacturer received $15.94, the wholesaler $1.06, the railroads $6.60, and the retailer $7.15. The value of standing timber, averaging probably $3.50 or $4 per thousand feet, is included in the manufacturer's portion.

The distribution of the consumer's price varies enormously between different grades of lumber and different market points. The amounts taken by the wholesaler and retailer are relatively stable—the former varying between 3 and 4 per cent of the delivered price and the latter between 21 and 29 per cent. The division of the balance between manufacturer and transportation company is governed (1) by distance from mill to market and (2) by the grade and relative selling value of the lumber.

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[1] The freights used in this section are based upon *list*, not *shipping*, weights, and doubtless average slightly higher than the freights actually paid.

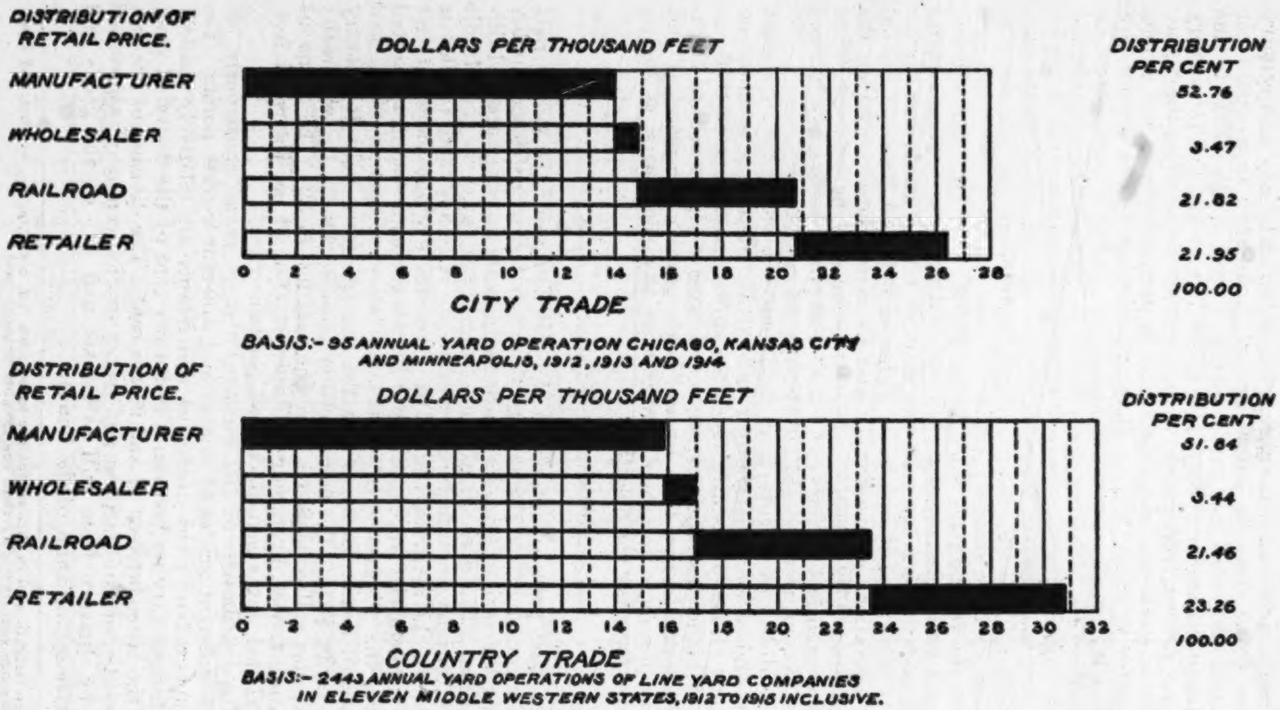

FIG. 10.—Distribution of average retail prices of lumber in city and country trade.

Since lumber freights are uniform for all grades and based on weight, the railroads obtain a much larger part of the retail price on lumber of low value than in the case of the higher grades. On No. 2 yellow-pine boards, for example, sold in Chicago for $22.25 per thousand feet, the mill received $9.80, or 44 per cent; and the railroads $6.25, or 28 per cent. But on shipments of flat-grain yellow-pine flooring, seasoned and dressed to a light weight, the manufacturer received $17.60, or 55 per cent of the selling price, and the railroads $5.50, or 17 per cent. Similarly No. 1 dimension Douglas fir, selling in Minneapolis for $27.35 per thousand feet, returned $6.80, or about 25 per cent, to the manufacturer, and $11.70, or nearly 43 per cent, to the railroads. On the other hand, seasoned vertical grain fir flooring, selling in the same market for $41, netted the manufacturer $20.35 and the railroad companies $9, or about 50 and 22 per cent respectively. On the grades of lumber retailed in the middle western markets as a whole, the manufacturer receives from 25 to 60 per cent of the delivered price, and the transportation companies from 15 to 45 per cent, running up as high as 50 per cent on common grades of Douglas fir shipped from the West Coast.

The large part of the price paid for lumber by consumers in the Middle West which is eaten up in transportation stands out strikingly. Figure 11, showing comparative transportation costs on common boards from different producing regions to several points in this territory, brings out the effect of distance of the source of supply upon retail lumber prices. The introduction of lumber from distant mills at higher freight rates is usually made possible by lower stumpage values or manufacturing costs, by special qualities which create a demand for it, or by other competitive advantages. In a broad way, however, such shifts in the source of supply for any market reflect the rising cost of lumber resulting from partial depletion of the most available timber. Substitution usually begins in the higher grades—the first to be reduced proportionately in the output of any region or to fail to meet an expanding demand and the freest to advance in price. The partial replacement of northern pine at Minneapolis by Douglas fir is an index to the increasing cost of certain grades to the consumer, due fundamentally to shortage in the nearer supply. This increase amounts undoubtedly to a considerable part of the added transportation charge, about $9.75 per thousand feet.

As noted above, the average cost of freight on lumber handled by middle western yards appears to be not far from $6 per thousand feet, or 21.5 per cent of the consumer's price, and is but slightly less than the cost of retail distribution. It seems probable that the share of freight in retail lumber prices throughout the entire United States is not much below this figure. The gross receipts of the railroad companies for hauling lumber, reported by the Interstate Commerce Commission for 1914, were $169,793,700. The estimated amount of lumber transported was about 34 billion board feet, which brings the average freight charge to nearly $5 per thousand feet.

THE RISING COST OF LUMBER.

The question remaining is, Why did retail lumber prices advance so rapidly prior to 1908?

The first cause is local exhaustion of standing timber which has moved the sawmill steadily away from the consumer and forced him to pay higher transportation costs. This is brought out in a broad way by the movement of the center of manufacture away from the center of population. From 1850 to 1870 the production of lumber centered in New York and Pennsylvania, while the center of popula-

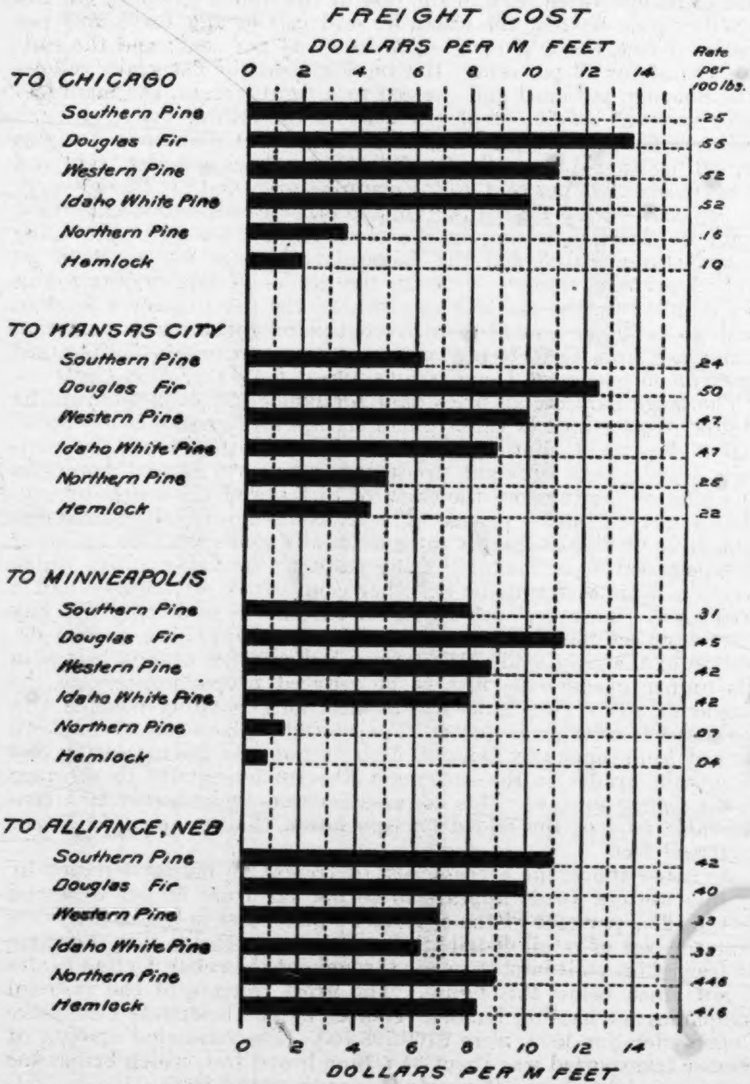

FIG. 11.—Comparative transportation costs per M feet on common boards of different species from producing points to four consuming points in the Central States. Basis: Estimated shipping weights, and producing points as follows: Southern pine, Bogalusa, La.; Douglas fir, Portland, Oreg.; western pine, Coeur d'Alene, Idaho; northern pine, Bemidji, Minn.; hemlock, Wausau, Wis.

tion moved from Parkersburg, W. Va., to Cincinnati, Ohio. From about 1875 to 1900, the Lake States led in the manufacture of lumber; the center of population moved westward meanwhile to the middle of Indiana. Since 1900, the bulk of the lumber cut has come from the South Atlantic and Gulf States, while the center of population has remained in western Indiana. The Pacific States now rank second in lumber production, and their cut of over 19 per cent of the total in 1914 foreshadows the next move of the center of lumber manufacture—some thousands of miles from the center of population. Western lumber paying freights of from $10 to $18 per thousand feet is already a considerable factor in the supply of the East.

It is impossible to measure the precise effect of these successive moves of the sawmills upon the greater cost of freight or the advancing price which the consumer has been required to pay. Unquestionably it has been large. It is illustrated in a general way by the diagram given on page 42. The effect of regional shifts in lumber production upon freights to a central eastern point may be illustrated by the following approximate rates per thousand feet on common building lumber from various regions to Pittsburgh.

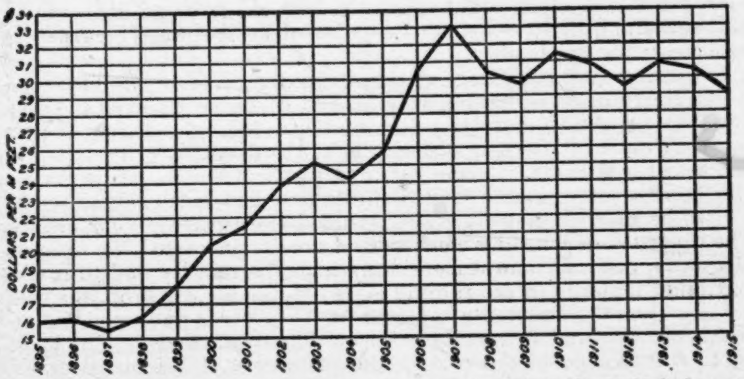

FIG. 12.—Trend of average retail price of lumber at rural points in Minnesota during past 21 years as shown by records of line yard company operating over 25 yards. Averages based on total yearly sales of lumber divided by total footage sold.

Eastern Pennsylvania (hemlock)	$2.10
Northern Peninsula of Michigan (white pine)	3.30
Central Wisconsin (hemlock)	4.75
Lower Mississippi Valley (yellow pine)	7.00
West Coast (Douglas fir)	17.00

Figure 12, showing the average yearly prices received at a number of retail yards in Minnesota over a long period, illustrates the effect of the partial exhaustion of local supplies of timber which made possible the importation of lumber at much higher freight charges. The rapid rise in price resulting from a growing local shortage is thus coincident with large importations of western lumber.

With the increasing length of lumber hauls has come a change to more expensive methods of transportation. Water transportation played a very large part in the movement of lumber until well into the eighties. Since then it has declined. This is probably due in part to the exhaustion of the timber accessible to water routes. Water shipments of lumber into Chicago, for example, reached their peak at 1,850 million feet in 1882. By 1914 they had dropped to 175 million feet. In 1875, 81 per cent of the lumber reaching Chicago came by water. In 1913 this proportion had dropped to less than 9 per cent. Of the lumber now consumed in the 11 Middle Western States fully 95 per cent is transported wholly by rail.

A second important factor in the rising price of lumber is the increased cost of retailing due to changes in the requirements of the trade and the more expensive service demanded by consumers. Twenty-five or thirty years ago white pine was practically the only commercial lumber handled in the retail yards of the Middle West. With buildings more largely wooden and less diversified, lumber was ordered and distributed in larger quantities than at the present time. Four or five grades met the requirements of the prairie States. Yards could be stocked adequately for $5,000 to $8,000, and all of the grades ordered from the same mill and obtained within 10 days. The small yard stocks necessary could be turned five or six times a year, while house bills could usually be ordered from mills or wholesale yards and delivered direct to point of use before the carpenter was ready for the lumber.

Following 1890 conditions changed rapidly. Yellow pine invaded the territory in an increasing volume, and yards were forced to carry duplicate stocks of northern and southern lumber. Other species followed until retailers, in order to meet the demands of their trade, had to carry five, six, or more different kinds of wood. Mills gradually became more remote from the markets, and much larger stocks had to be carried by retailers to avoid delays in supplying orders. The diversity of building construction greatly increased the number of grades, patterns, and dimensions which the retailer had to carry, and other materials were rapidly added to lumber. All of this told heavily upon the size and equipment of retail yards and upon the investments required to maintain them. The replacement of a large part of the carpenters' work by the planing mill led many yards, particularly in the larger cities, to meet this new competitive element by adding planing mills to their plants. Operating expenses increased at the same time by reason of higher wages paid to labor and the greater demands of the trade for wagon deliveries, extended credits, and other special forms of service.

Through this development business on the whole was good and profits large; but the cost of retailing lumber steadily increased. The high prices obtained for lumber constantly invited more yards to enter the field. Since about 1895 the decreasing volume of lumber handled by the average dealer has had an important bearing upon the cost of distribution. The increasing number of wholesalers in the Middle West during the decade ending in 1910 caused a shrinkage in the average volume of lumber handled of from 50 to 60 per cent. This led to wholesaling lumber on a somewhat smaller margin than in former years; but the greater number of wholesalers, commission men, and jobbers participating in the trade has undoubtedly increased the service charge on lumber. This arises, in part at least, from the greater economic service rendered by distributors under the present day diversity and specialization of demand and the distance of manufacturer from consumer.

The same development has been more marked in lumber retailing. By 1900 Nebraska had a retail yard for every 1,485 people; Iowa a yard for every 1,600 people; and Illinois, outside of Chicago, a yard for every 1,720 people. From 1900 to 1915 the number of yards in these three States increased on the average nearly 26 per cent, although their population increased but 7 per cent. The effect of such a reduction in the average volume of business upon distributing costs is brought out on page 33.

In other words, retail prices have gone up in part as the result of the active demand for lumber prior to 1907 with its depletion of eastern forests, in part because of the added service required of distributors, and in part by reason of the increasing number of dealers which these very factors have brought into the field. Trade conditions, undoubtedly influenced to some extent by local agreements among dealers, have counteracted somewhat the competitive tendencies growing out of the larger number of distributors.

Another factor tending to increase the cost of lumber to consumers has been the growing cost of logging in nearly every manufacturing region as the more accessible timbered areas are cut out and logging works back into rougher and more distant territory. Though offset partly by improvements in logging methods and equipment, this is an element which in the long run would normally be reflected in lumber prices in exactly the same way as higher freight charges from mill to consumers. Changes in the quality of timber also affect the prices of particular grades. This applies to regions like New England, the Lake States, or the southeastern pineries, which have cut out the bulk of their old growth yielding the largest proportions of high-grade lumber. The rising price of high-grade finishing lumber, flooring, large timbers, and clear stock for special uses is reflected to-day in increasing shipments of these grades from the far western States across the Mississippi River at freight rates of $12 to $19 per thousand board feet.

Finally, it must not be overlooked that the cost of lumber like that of all commodities has been influenced by the decreasing purchasing power of money. A standard of comparison, based on the combined prices of 256 commodities, is published annually by the Bureau of Labor Statistics.[1] From the application of this standard, it appears that in 1897 $1 in money would buy one and one-half times as much as in 1913; in other words, that prices at large in 1897 were 67 per cent of those that held in 1913. If applicable without qualification to lumber, this general depreciation in the value of money would account for $7.50 out of a $30 retail price as between 1897 and 1913.

While these factors explain the greater part of the rising cost of lumber, they doubtless do not tell the whole story. Joint action by manufacurers or distributors has undoubedly, at various times and in various localities, aided this movement of lumber prices. It seems probable, however, that the influence of such restraints upon trade in the Middle West has been local rather than general in character; and that in the broad, nation-wide changes taking place in the cost of lumber they have not had a large part.

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[1] In bulletins entitled "Wholesale Prices."

In 1907, or soon after, the results of overproduction of lumber became apparent. Competition in all branches of the industry was intensified. Since that time lumber prices have made no material advance in the Middle West, and from 1913 to the latter part of 1915 there was a noticeable decline.

In figure 13 the average mill price of southern yellow-pine lumber from 1890 to 1914 is compared with the wholesale prices of five other staples—beef, hay, brick, iron, and coal. The general similarity in price waves between lumber and the other structural materials indicates that its price movements have been governed to a large degree by broad business and economic conditions. The mill prices used in this chart do not show the increases in wholesale or retail rates at consuming points resulting from lengthening freight hauls between mill and market. The prices of many kinds of lumber also, particularly high grades manufactured in small volume and used for less staple purposes, would show greater advances. The curves, however, illustrate the general price movements which have taken place.

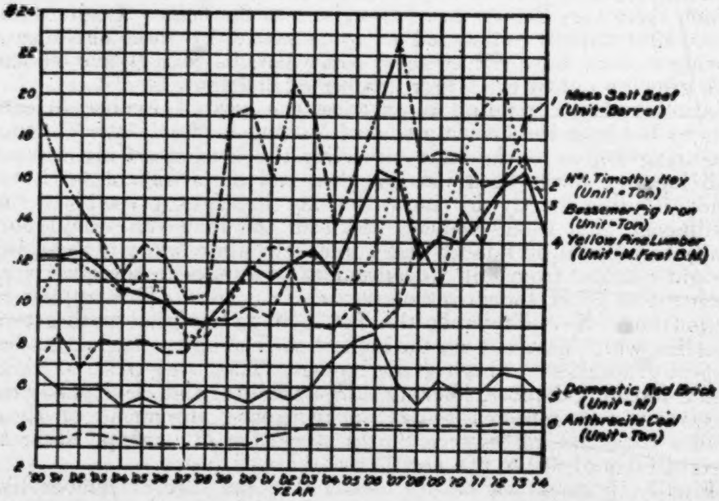

FIG. 13.—Fluctuations of wholesale prices of lumber and other commodities, 1890–1914.

1. Data taken from Bureau of Labor Statistics Bulletin 181, based upon New York quotations furnished by the statistician of the New York Produce Exchange.
2. Data taken from Bureau of Labor Statistics Bulletin 181, based upon Chicago quotations from the Price Current Grain Reporter.
3. Data taken from Bureau of Labor Statistics Bulletin 181, based upon Pittsburgh quotations from the Iron Age.
4. Data compiled by the Forest Service, based upon the average f. o. b. mill selling price of all grades of yellow-pine lumber in annual sales aggregating from 160 to 3,000 million feet.
5. Data taken from Bureau of Labor Statistics Bulletin 181, based upon quotations from reliable private sources.
6. Data taken from Bureau of Labor Statistics Bulletin 181, based upon quotations from reliable private sources.

The advance for a period of 10 years or so prior to 1907 was common to a large majority of the commodities in general use. In this advance lumber was well to the front, leading most other products except foodstuffs. Since 1907 price movements have been less uniform and lumber has dropped behind the average of other articles.

OVERPRODUCTION AND COMPETITION.

The home demand for lumber is not fixed, but changing, and during the last nine years has decreased. Failing to govern their output accordingly, lumbermen have frequently overcut their markets. Less than living prices and waste of raw material are the evidence. Overlarge mill capacity, taxes on large timber holdings, interest on borrowed funds, and maturing bonds to be paid off have all contributed. Chief among the causes, perhaps, is the unloading of timber the profit in whose future holding has become doubtful.

With local exceptions, lumber production is competitive. There is competition within each of the big producing regions, especially keen when the market is going against the manufacturer, more restrained when it is in his favor. And there is widespread competition between different manufacturing regions, fought out in many markets. Added difficulties in the way of a general lumber trust are found in the competition of substitute materials, the limited inroads of foreign timber, and the check furnished by public forests.

Lumber distribution in the Middle West was found to be competitive for the most part. Its restraints upon trade are local, not general, and its more significant trade developments are tending to increase competition.

TENDENCIES TOWARD OVERPRODUCTION.

From the standpoint of the manufacturer, overproduction begins when lumber prices do not return the cost of production with a living profit. In the large softwood regions this was true throughout 1914 and most of 1915, notwithstanding that the lumber manufactured could be sold at some price. The amount of overproduction at any time can hardly be estimated. Small excesses in cut over demand may cause disproportionate decreases in price, as slight curtailments below the requirements of the market may lead to abnormal advances. Aside from price fluctuations, however, overproduction from a broad public standpoint is indicated by the abnormal waste of low-grade material and the use of high-quality timber for low-grade products, which took place in 1914 and 1915.

To the consumer overproduction can hardly be reconciled with the high cost of lumber. This paradox results from the depletion of timber in the regions accessible to the larger markets, together with the other causes of mounting prices which have been discussed. Southern and western manufacturers can make good these local timber shortages only at high freight charges; hence high lumber costs to consumers as compared with 15 or 20 years ago are not inconsistent with mill prices which may force the manufacturer to close his plant.

The causes of overproduction are not far to seek. The industry is carrying an installed mill capacity of approximately 117 billion feet as against an estimated cut in 1914 of 40.5 billion. The greater part of this excess in old or small mills in the Eastern and Southern States can remain idle without becoming a serious burden upon the producing plants. There is an excess, however, of 60 per cent or more in each of the regions now making the heaviest cuts, which consists largely of unused capacity at mills which run but part time or but part of their saws, or which are compelled to shut down altogether for considerable periods. The pressure of these idle mill investments, in an industry none too strongly financed, tends to keep the output of lumber up to all or more than the market will take without breaking. Plant shutdowns are costly on account of overhead expenses for upkeep, protection, etc., which must be met. The breaking up of lumbering organizations and their subsequent reassembling always involve losses in efficiency which the operator is loath to incur. Frequently also a sense of obligation to support the labor and local communities gathered around a sawmill has prevented curtailment when called for by the conditions of the market or has resulted in insufficient curtailment. Inexact knowledge of operating costs on the part of many lumber manufacturers is an additional factor contributing to overproduction.

A second important cause of overproduction is the need for meeting current charges on timber and mill investments. These include taxes on timberland and plant, interest on borrowed capital, and payments on the principal of bonds and other forms of indebtedness. The effect of such burdens can be gauged correctly only in relation to the volume of productive business which in the long run must be counted upon to carry them. The timberland tax in western Oregon and Washington, for example, amounts to 90 cents per thousand feet on the present yearly cut, in the Inland Empire to about 97 cents, and in California to 80 cents per thousand feet. The total yearly tax on timberlands and lumber plants in these three regions, approximately $8,640,000, is equivalent to about $1 per thousand feet on their present cut. The annual tax upon a single western holding, estimated by the Bureau of Corporations at 96 billion feet, amounts to over $1,000,000. To meet this charge would require a yearly cut from that property of half a billion feet of timber.

The yearly interest bills of the industry, including its timber bonds, have been estimated roughly at $10,964,000 in the southern pineries, $2,500,000 in the Inland Empire, $3,700,000 on the West Coast, and at least $2,090,000 in California. These are equivalent to charges on the 1914 cut ranging from $0.70 to $1.60 per thousand feet in the various regions. Part of this interest is paid, of course, out of the pockets of investors and part of it by further borrowings. Both simply postpone the day of reckoning and pile up an increasing future pressure upon lumber production.

Serial payments upon the principal of timber bonds carried by stumpage and manufacturing plants on the West Coast will amount to approximately $2,350,000 in 1916, or about 44 cents per thousand feet on the present lumber cut. The yearly sinking fund now due on the timber bonds in California of which a record was obtained amounts to about $1.50 per thousand feet on the present lumber cut of the State. On the output of a number of companies which carry these bonds, yearly payments of principal form a charge of $3 or more per thousand board feet. Similarly 27 operations in the South are required to set aside an average of $2.10 per thousand feet of lumber cut to meet bond maturities.

The combined burden of taxes, interest, and current payments on timber bonds is necessarily heavier in the West than in the South. For every thousand feet of yellow-pine lumber cut there are about 23½ thousand feet of stumpage; but for every thousand cut in the Northwest there are 109 thousand feet of standing timber. The total yearly charge for interest, taxes, fire protection, and bond payments on the West Coast is equivalent to about $2.15 on each thousand feet of lumber manufactured. In the Inland Empire this amount probably exceeds $3 per thousand feet, and in California it probably exceeds $4 per thousand of the present lumber output. In the southern yellow-pine States, on the other hand, where production is much greater in proportion to timber supply, these items total something less than $2 per thousand feet of the present yearly cut.

These amounts are obviously more than the fixed charges borne by the present lumber output. But they picture in a broad way the burdens which the industry as a whole is carrying and from which sooner or later it will seek relief through manufacture. The cumulative weight of current charges is indicated here from the standpoint of the investor. Obviously it may not be possible to pay them back through lumber manufacture. That is the chance which the lumberman takes, and it tends automatically to force cutting upon the mills and prevent curtailments which may be demanded by business conditions.

Interest upon the unborrowed portions of timber and mill investments is not included in these fixed charges, being a return expected at the time of realization. The certainty of such returns depends largely upon the course of lumber and timber values. Uncertainty on this score is the third general cause of overproduction. There has been no increase in the market price of stumpage in the West for the past eight years and in the South for the past three years; meanwhile taxes and other carrying charges are piling up. Uncertainty as to future timber values is tending to force cutting while there is still opportunity for profit. The unloading of stumpage is probably the most fundamental cause of overproduction, and shows strikingly how lumber manufacture has been weakened by entanglement with timber speculation.

A secondary cause important especially in the South has been the practice of buying "timber rights," separate from the land, with stated periods for the removal of the stumpage. Operators have often been forced to log such tracts unseasonably or forfeit their purchase price.

The idea must be abandoned that there is a more or less fixed, or "normal," demand for lumber; and that the industry can expect a satisfactory return on a cut up to this assumed amount. The demand for lumber is changing from year to year. During the last nine years it has decreased, though irregularly. Timber shortages in the older regions, increasing the cost at which consumers can be supplied, are reducing the relative consumption of lumber in the United States. The development of new uses at home and of new markets abroad may in the long run keep the demand for the products of the industry undiminished; but the amount of lumber needed from year to year will rise and fall. Overproduction has resulted from ineffective adjustment of the output of the industry to these changes in volume of consumption.

COMPETITION IN LUMBER PRODUCTION.

There is no question, broadly speaking, as to the competitive character of lumber production in the four regions which were studied. This is evidenced by marked fluctuations in mill prices from year to year and the recurring years when prices have been forced down to points which do not represent living conditions for many manufacturers, and which in fact have forced many of them out of the business. Bankruptcies have taken a heavy toll of lumbermen, especially in 1914 and 1915, and particularly among the smaller mills. A much larger number of plants, especially those of small capacity, were forced to shut down during considerable portions of the two years.

A further indication of the competitive character of the industry is the considerable difference in the prices obtained by different manufacturers for the same grade of lumber at the same time. Many cases were disclosed in 1914 and 1915 of differences in the current prices received by mills in the same region of from $2 to $6 per 1,000 feet, or from 20 to 30 per cent of the lower price, aside from differences arising from the location of mills in relation to their markets and from their methods of selling lumber. Irregular prices between different mills were found in fact to be the general rule.

Competition in the manufacture and sale of lumber is of two kinds: (1) Within each producing region, and (2) between different regions in selling their product in markets within common reach.

With local exceptions of comparatively little importance from the standpoint of the general lumber trade, competition in mill sales of lumber is the usual condition within each of the regions studied. The competition between individual mills was found to extend even to plants in the same ownership and to sales between mills and their own agencies. There is further competition between groups of mills in different valleys or on different tidewater frontages or subject to different freight rates to important markets. This is evidenced particularly by hard-fought struggles for advantages in freight tariffs, and not infrequently by price reductions in the efforts of the respective groups of manufacturers to hold or obtain the trade of a particular region.

Competition in mill sales of lumber is most apparent when the market is falling. The lumber industry has invariably shown the least cohesion when confronted with a slackening demand for its product, with manufacturers often rapidly underselling each other under pressure to unload their stock. On the other hand, lumbermen frequently follow a common policy, based upon information obtained cooperatively, and this has its effect on prices. On a rising market there is a much clearer tendency to pull together.

Equally keen and less variable is the competition between different producing regions wherever freight rates make it practicable. Figure 14 brings out the interlacing lines of competitive lumber shipments from the South, West, and North into the Mississippi Valley. Regional competition for the markets of the whole country is indicated further by figure 15, which shows the distribution of lumber from the principal producing regions in 1914. Nebraska's annual consumption of lumber, for example, includes 21,993 cars of southern pine, 13,500 cars of Douglas fir, and 3,503 cars of western pine from the Inland Empire. Illinois takes 63,257 cars of yellow pine from the lower Mississippi River States, 1,951 cars of yellow pine from Georgia and Florida, 9,000 cars of Douglas fir from the West Coast, 13,288 cars of hemlock from Michigan and Wisconsin, 3,566 cars of western pine from beyond the Rocky Mountains, and 7,566 cars of northern pine from the Lake States.

One of the most bitterly contested battle grounds in this war of lumber-producing regions is in the States west of the Mississippi

River, where southern pine and Douglas fir struggle to control the market for all-round structural wood. The line of market domination has shifted repeatedly with changes in price in one region or the other, particularly when the accumulation of lumber stocks has led to price cutting. Water shipments of Douglas fir through the Panama Canal bid fair to develop a new field of competition with its southern rival on the Atlantic seaboard.

Western New York, Pennsylvania, and northern Ohio is another region of keen competitive conflict. Other markets are closely contested between yellow pine and the spruce of the Northeast on the northern Atlantic seaboard and the spruce of the Allegheny Mountains in the Middle Eastern States, and between the three distinct groups of yellow-pine mills in (1) the lower Mississippi and Gulf States, (2) Georgia and Florida, and (3) Virginia and the Carolinas.

The overstocked lumber yards of 1914 and 1915 brought many striking illustrations of this interregional competition. The Douglas fir of northern California was practically crowded out of its own local markets for rough construction lumber by the same species manufactured in Oregon and Washington and pushed out at low prices. Douglas fir threatens, in fact, to wrest most of the interior market of California for low-grade lumber from the local mills, as it has already wrested the markets along the coast. The effect of low prices on Douglas fir has been felt throughout the whole Rocky Mountain region as far east as the Black Hills of South Dakota, in the closing down of many small local mills which were unable to meet this competition. Similar conditions in the southern pine mills resulted in widespread encroachment by this species upon the markets for rough construction lumber formerly held by northern hemlock. This pressure is always greatest from the larger producing regions, where overproduction is most acute.

A further index of the demoralized lumber market of these years was the number of "transit" cars shipped to points like Chicago in advance of any purchase, billed to commission houses to be sold as near a stated price as might be but in the last analysis for whatever they might bring. The bills of lading on such cars were often used by hard-pressed manufacturers as security for loans.

The extent and intensity of this interregional competition, backed by some 49,000 sawmills in various parts of the country, indicate the inherent obstacles to any general combination of lumber manufacturers in the United States which would be effective. The report of the Bureau of Corporations upon the lumber industry in 1910[1] brings out the attempts to restrain competition which at times have been more or less common in all of the principal producing regions, particularly efforts to maintain wholesale lumber prices through lists published by the manufacturers' associations and other means. In the regions covered by the inquiry of the Forest Service, it was found that restraints of trade at the present time are local and restricted, and that their effect upon the competitive conditions in the industry as a whole is relatively unimportant. Certainly, in the aggregate, efforts of this nature have been ineffective against the powerful forces making for competition.

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[1] Part IV, Conditions in Production and Wholesale Distribution.

In addition to the antitrust laws and the activities of public agencies charged with their enforcement, unrestrained trade is promoted by: (1) The competition of substitute materials, (2) the competition of foreign lumber and of second growth in old lumbering regions, and (3) the ownership of large quantities of timber by the public.

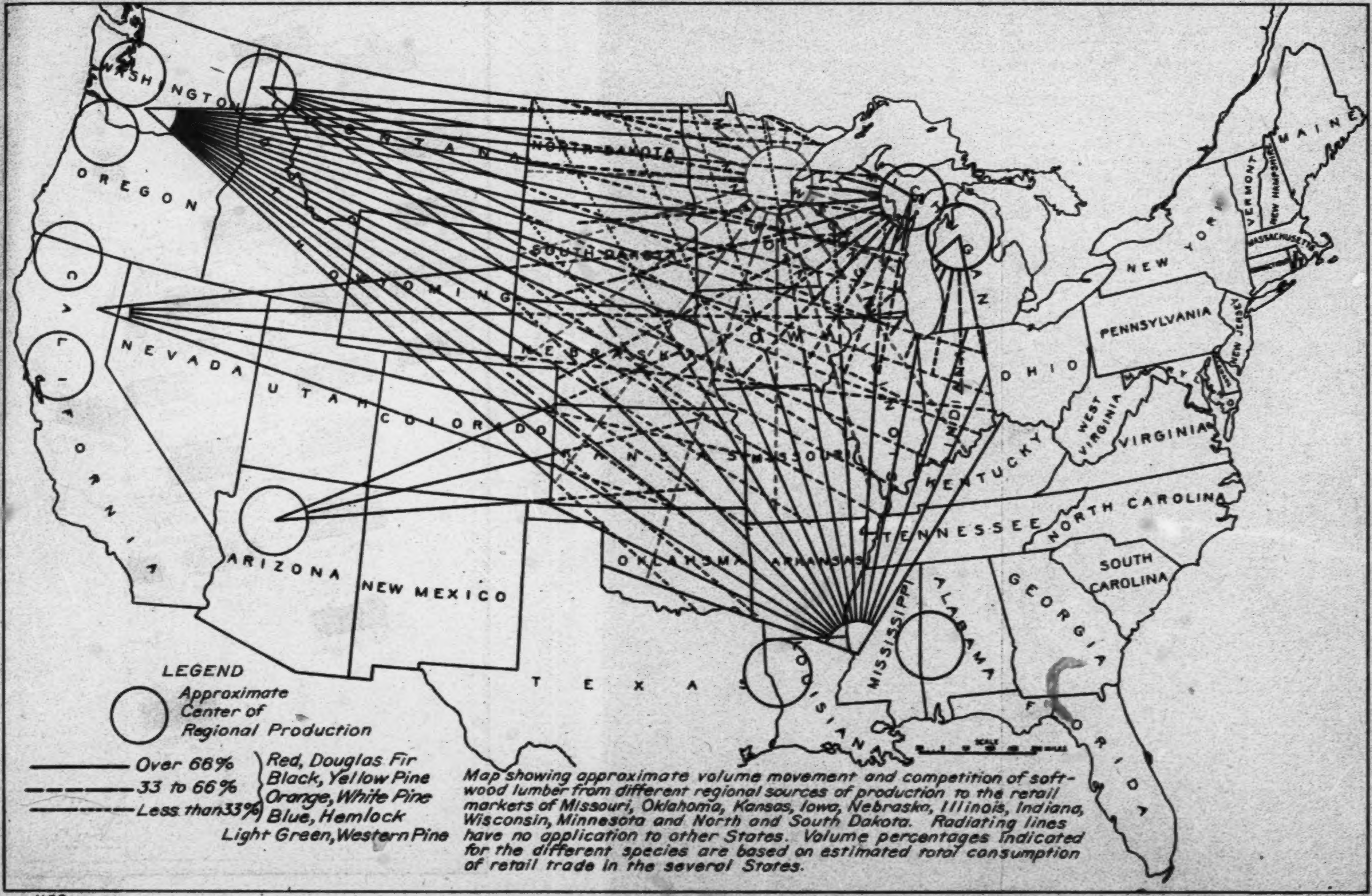
As brought out in the discussion of the "Changing lumber requirements of the United States," cement, steel, patent roofing, and other substitutes for wood have not only cut heavily into the market for lumber, but impose quite definite limits upon the prices which can be charged for many of its common uses.

Competition with foreign timber has as yet been a factor in but few localities and in marketing but a small part of the lumber cut. The most important competition has come from imports of Canadian lumber along the Great Lakes and the northern Atlantic coast, from imports of British Columbia cedar shingles and fir lumber cut on the West Coast, and from imports of pine lumber from the large timbered region of northwestern Mexico. During the last 10 years the imports of lumber have averaged about 1,646,000,000 board feet annually, or something under 4 per cent of the home production.

Foreign timber has thus never been an important competitive factor in the American trade as a whole. Its greatest potential development lies in imports of softwoods for all-round structural uses from Canada and Mexico, particularly by the water routes available to the former. Otherwise the demands of many other countries which produce less wood than they consume and the handicap of high freights in reaching the American market will tend to restrict imports of foreign timber largely to hardwoods and other special products not grown at home. Except as much higher lumber prices may be reached in the future, there is little likelihood that foreign lumber will be a competitive factor of general importance in supplying the United States. Its competition will be felt heavily in the efforts of American manufacturers to develop their export trade, increasingly so doubtless as the undeveloped coniferous forests of Russia, Siberia, and the Japanese possessions are more actively exploited. To meet its own future requirements, however, at reasonable prices, the United States must remain self-supporting in its production of wood. Hence the need for thrifty use of our present timber resources and for the practice of forestry to insure a future supply.

Of greater moment is the actual and potential increase in timber production in the old forest regions of the United States. As set forth in the discussion of "Logged-off lands and forest renewal," this is already a factor to be reckoned with in sections like New England and the southeastern pineries. A material increase in lumber production from such old regions within the life of many of the present timber and manufacturing investments in the West and South appears probable. With it will reappear the old lumbering industry, made up of small mills supplying local markets for the most part but cutting into the trade of the present large producing regions. This is a future competitive factor of importance.

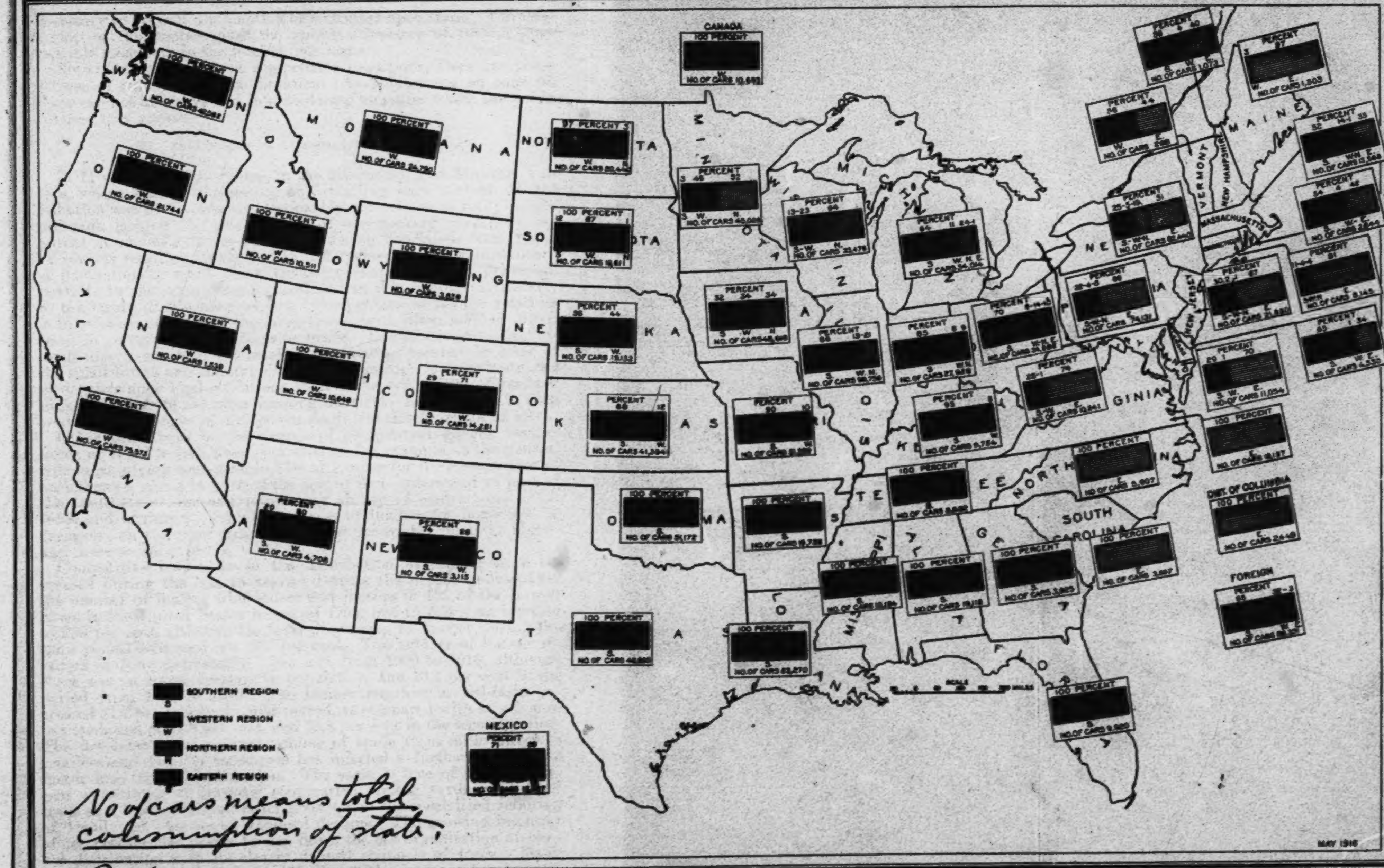
The National Forests, comprising one-fifth of the timber in the United States, are unquestionably an aid to competition in lumber manufacture. From them independent and competing mills can be supplied with raw material under such public regulation as may be


WASHINGTON
OREGON
CALIFORNIA
NEVADA
ARIZONA
UTAH
COLORADO
NEW MEXICO
TEXAS
MONTANA
IDAHO
WYOMING
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
NEW JERSEY
VERMONT
NEW HAMPSHIRE
MAINE
MASSACHUSETTS
SCALE
LEGEND
Approximate Center of Regional Production
Over 66%
33 to 66%
Less than 33%
Red, Douglas Fir
Black, Yellow Pine
Orange, White Pine
Blue, Hemlock
Light Green, Western Pine

Map showing approximate volume movement and competition of softwood lumber from different regional sources of production to the retail markets of Missouri, Oklahoma, Kansas, Iowa, Nebraska, Illinois, Indiana, Wisconsin, Minnesota and North and South Dakota. Radiating lines have no application to other States. Volume percentages indicated for the different species are based on estimated total consumption of retail trade in the several States.

FIGURE 14.

U. S. Department of Agriculture, Secretary's office, Report No. 114.


WASHINGTON
100 PERCENT W. NO. OF CARS 42,082
OREGON
100 PERCENT W. NO. OF CARS 21,744
IDAHO
100 PERCENT W NO. OF CARS 10,511
MONTANA
100 PERCENT W. NO. OF CARS 24,790
WYOMING
100 PERCENT W. NO. OF CARS 3,859
CALIFORNIA
100 PERCENT W NO. OF CARS 75,573
NEVADA
100 PERCENT W NO. OF CARS 1,539
UTAH
100 PERCENT W. NO. OF CARS 10,648
COLORADO
PERCENT 29 71 S. W. NO. OF CARS 14,281
ARIZONA
PERCENT 20 80 S. W. NO. OF CARS 4,708
NEW MEXICO
PERCENT 74 26 S. W. NO. OF CARS 3,115
CANADA
100 PERCENT W. NO. OF CARS 10,692
NORTH DAKOTA
97 PERCENT 3 W. N. NO. OF CARS 20,442
SOUTH DAKOTA
100 PERCENT 12 87 1 S W. N NO. OF CARS 19,611
NEBRASKA
PERCENT 56 44 S. W. NO. OF CARS 19,152
KANSAS
PERCENT 88 12 S. W. NO. OF CARS 41,394
OKLAHOMA
100 PERCENT S. NO. OF CARS 31,172
TEXAS
100 PERCENT S. NO. OF CARS 46,880
MINNESOTA
PERCENT S 45 32 S. W. N. NO. OF CARS 45,585
IOWA
PERCENT 32 34 34 S W N NO. OF CARS 45,916
WISCONSIN
PERCENT 13-23 64 S-W. N. NO. OF CARS 33,478
MICHIGAN
PERCENT 64 11 24-1 S W. N. E. NO. OF CARS 34,014
ILLINOIS
PERCENT 66 13-21 S. W. N. NO. OF CARS 96,736
INDIANA
PERCENT 85 6 9 S W. N. NO. OF CARS 27,929
OHIO
PERCENT 70 6-14-10 S. W-N. E. NO. OF CARS 34,895
MISSOURI
PERCENT 90 10 S. W NO. OF CARS 31,389
KENTUCKY
PERCENT 95 5 S. W NO. OF CARS 9,754
ARKANSAS
100 PERCENT S. NO. OF CARS 19,738
TENNESSEE
100 PERCENT S. NO. OF CARS 8,892
LOUISIANA
100 PERCENT S. NO. OF CARS 25,270
MISSISSIPPI
100 PERCENT S. NO. OF CARS 10,194
ALABAMA
100 PERCENT S. NO. OF CARS 10,119
GEORGIA
100 PERCENT S. NO. OF CARS 3,985
FLORIDA
100 PERCENT S. NO. OF CARS 9,920
SOUTH CAROLINA
100 PERCENT E. NO. OF CARS 3,807
NORTH CAROLINA
100 PERCENT E. NO. OF CARS 5,907
VIRGINIA
100 PERCENT E. NO. OF CARS 18,137
WEST VIRGINIA
PERCENT 25-1 74 S-W. E. NO. OF CARS 10,941
PENNSYLVANIA
PERCENT 26-4-5 65 S-W-N. E. NO. OF CARS 74,121
NEW YORK
PERCENT 25-5-19. 51 S-W-N. E. NO. OF CARS 62,440
VERMONT
PERCENT 56 44 W. E. NO. OF CARS 2,188
NEW HAMPSHIRE
PERCENT 36 4 60 S. W. E. NO. OF CARS 1,073
MAINE
PERCENT 3 97 W. E. NO. OF CARS 1,303
MASSACHUSETTS
PERCENT 52 14-1 33 S. W-N. E. NO. OF CARS 13,598
PERCENT 54 4 42 S. W- E. NO. OF CARS 2,544
CONNECTICUT
PERCENT 1-4-4 91 S-W-N E. NO. OF CARS 5,145
NEW JERSEY
PERCENT 30-2-1 67 S-W-N E. NO. OF CARS 21,830
PERCENT 65 1 34 S. W. E. NO. OF CARS 4,535
PERCENT 29 1 70 S. W. E. NO. OF CARS 11,054
DIST. OF COLUMBIA
100 PERCENT E. NO. OF CARS 2,640
FOREIGN
PERCENT 65 32-3 S. W. E. NO. OF CARS 28,301
MEXICO
PERCENT 71 29
SCALE 0 50 100 150 200 MILES
S SOUTHERN REGION
W WESTERN REGION
N NORTHERN REGION
E EASTERN REGION
MAY 1916

No of cars means total
consumption of state,

L Roths estimate is
20 M ft. p. car. = 50-60 m ft,

DISTRIBUTION OF LUMBER FROM PRINCIPAL PRODUCING
REGIONS — BY STATES

FIGURE 15.

necessary to prevent combination or restraints upon trade. The ownership of this timber gives the public a measure of control upon possible monopoly in the lumber industry.

Notwithstanding present competitive conditions, there are possibilities of monopoly in the situation. As pointed out on page 68, these can not be overlooked in considering measures which the public interest may require.

COMPETITION IN LUMBER DISTRIBUTION.

In 11 of the Central States, in the Mississippi and Missouri Valleys, where lumber wholesaling and retailing were studied, its distribution was found to be unquestionably competitive at many points, although lacking the acute phases of overstocking frequently apparent at manufacturing plants. Differing conditions were found at various retailing points and in different types of establishments. A fluctuation in retail prices following changes in mill prices appears to be the more common condition in this region, particularly at the larger distributing centers. Competition in lumber retailing is in evidence in most of the large towns, with often marked differences in going prices for the same grade. Competitive retailing extends also to many of the smaller distributing points. In some of the small towns and country districts competition is more restricted or depends upon local conditions, such as the availability of yards at different points to the same farming districts. Retail prices in such trade reflect changes in mill prices much less closely or not at all.

Other differences in the degree of competition govern various kinds of retail sales. Keen competition, for example, is the general rule in supplying considerable bills of lumber for the construction of buildings—a result in part of the size of such orders and in part of the trade knowledge and purchasing ability of contractors, architects, and engineers. Small purchases of lumber for household or farm use, on the other hand, are almost invariably made at higher and more uniform prices.

Competitive tendencies in the distribution of lumber have increased during the last 15 years. During the decade ending 1910 the number of lumber wholesalers and jobbers in 155 of the largest cities in the United States increased from 896 to 3,032, an increase of 238 per cent, although the total production of lumber during the same period advanced but 26.9 per cent. The number of lumber retailers in Iowa increased 9.7 per cent from 1900 to 1910, although there was an actual decrease in population, and 13.2 per cent in the period from 1900 to 1915. The lumber retailers in Nebraska increased 31.7 per cent in the first period, as compared with an advance in population of 11.8 per cent, and 35.8 per cent in the second period. The development of a large volume of trade from mills direct to retailers and to large consumers has injected a further competitive factor into lumber distribution. The same is true of the more recent appearance of farmers' cooperative lumber yards, of lumber trade as a branch of mail-order houses, and the specialized retailing of "ready cut" houses of standard designs. The growing intensity of competition has partly broken down the old organization of lumber distribution with its clearly defined channels of trade. Many concerns conduct both a wholesale and retail business; and an increasing volume of direct shipments in carload lots, from mill to consuming point, is handled by all classes of distributors on low margins.

Various local combinations or agreements among retailers in the Central States undoubtedly exist, and these have restrained in some degree the competitive tendencies growing out of the large increase in the number of dealers. Such combinations, however, are believed to be restricted and local in character, rather than forming a general trust. The data obtained leaves little question that their total effect upon the competitive character of the lumber trade in the Middle West is not great. This is based upon the retail prices obtained from over 2,500 annual yard operations, which indicate by and large competitive price movements in response to general or local trade conditions.

Competition is most commonly restricted or lacking at small country points which maintain but one or two dealers. This applies, of course, to the distribution of practically all commodities. It is offset to a greater or less degree by the community service rendered by many such tradesmen, who handle small volumes of lumber, concrete, coal, hardware, or what not; and whose total year's profits are seldom large as livelihoods gained in merchandising go.

Competition in lumber distribution is unquestionably less rigorous than in lumber manufacture. As far as the studies conducted in four of the principal producing regions and one of the great consuming regions indicate, distribution pays somewhat higher profits than manufacture and is more stable in its prices and net returns.

WHY THE LUMBER INDUSTRY IS UNSTABLE.

CHANGING LUMBER REQUIREMENTS OF THE UNITED STATES.

Economic and social changes in the United States are reducing the use of lumber in proportion to other structural materials. Uses lost to other structural materials within the last 10 years equal one-fifth of the present yearly cut. Since the year of heaviest demand, 1906, the home consumption of lumber per capita has dropped nearly one-fourth.

Lumber's competitors will undoubtedly restrain future increases in its cut and price to a considerable degree. And yet there is every reason to believe that the United States will need all of the timber which it has.

The economic and social development of the United States is decreasing its per capita demand for lumber. This is coincident with the change from pioneer to settled life, the growth of cities, and the increasing proportion of urban population. It reflects the changes in the habits and requirements of people as between new, developing regions, rapidly settling and building up, like the Mississippi Valley from 1850 to 1890, and well-developed, thickly settled regions like the Mississippi Valley of to-day. Particularly it reflects the movement of the bulk of building from the country to the city and town and the changed requirements of urban construction. The more common types of city business and office buildings, the architectural and engineering requirements imposed by construction within city limits, the restrictions of city fire ordinances and insurance companies have all tended to reduce the consumption of lumber.

The same result has attended the modern development of engineering in railroad and other lines and changes in customs or public demands, as for the steel passenger coach or cement sidewalk. It has been hastened by the scientific development and aggressive exploitation of various structural materials, like steel, cement, and composition roofing, and by the general increase in lumber prices prior to 1907. Broadly viewed, however, a decreasing relative demand for lumber reflects the normal development of every region after a certain point in its economic life is passed. This is well brought out by the per capita consumption of new States or countries compared with that of old and fully developed ones. Montana, for example, has a yearly lumber requirement of approximately 1,234 board feet per head of population and Oregon of 714 board feet, as compared with about 206 feet in New York and 292 feet in Pennsylvania. The per capita lumber consumption in the United States, estimated at 375 board feet in 1915, may similarly be contrasted with 150 board feet in Germany, 90 board feet in France, and 102 board feet in England.[1]

A large factor in the decreasing per capita consumption of lumber is local shortage of timber in parts of the United States. The resulting high cost of lumber has necessarily restricted its use. Lower prices account in part for the freer use of wood in new regions. Greater forest production in the "cut-out" States would tend to increase their consumption of timber.

DISPLACEMENT OF LUMBER BY OTHER MATERIALS.

The effects of this change upon the lumber market have been most pronounced within the past 10 years, although beginning at a much earlier date in many parts of the United States. The Forest Service has estimated the extent to which the demand for lumber has been restricted within that period by the use of other structural materials. This is based upon information obtained from a large number of retail lumbermen, first in 1910 and again in 1915; upon an analysis of the building permits issued by 20 American cities from 1904 to 1913, inclusive; upon a study of the production of lumber's principal competitors—cement, steel, composition roofing, fiber boxes, etc., in comparison with lumber itself; and upon such data as could be obtained regarding important lumber-using industries like car construction, farm machinery, vehicles, cooperage, etc.

Exact figures on the displacement of lumber by other materials are impossible to obtain. The following represents a conservative estimate, the best which it has been practicable to make from the data available. It represents in each case, not the total production of competing materials, but their estimated substitution for lumber, within approximately the last 10 years, in uses for which formerly lumber was chiefly employed. These figures do not include, for example, the steel and concrete skyscraper or the cement dam, which represent, broadly speaking, new forms of construction for which lumber was never used.

In building construction, steel, brick, concrete, etc., appear by 1914 to have replaced lumber to the extent of some 2,700,000,000 board feet annually. Metal shingles, tile, slate, and various composition roofings have replaced the wooden shingle to an amount approximating 1,440,000,000 board feet of timber annually. The substitution of fiber for wooden boxes has reduced the use of lumber about 1,070,000,000 board feet yearly, and of steel for wooden railroad cars about 261,000,000 feet. Steel and concrete fencing and fence posts have replaced approximately 4,030,000,000 feet of wood annually, about 3,000,000,000 feet of which is lumber; and cement sidewalks have replaced about 603,000,000 feet. Further substitutions of metal for wooden cooperage, lath, vehicle parts, wood used in ship construction, and wooden furniture and interior house trimming bring the total annual replacement to approximately 11,074,500,000 board feet of timber. It is probable that not less than 8,092,200,000 feet of this amount is in the form of lumber, or the equivalent of 20 per cent of the lumber cut in the United States estimated for 1914.

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[1] Based upon official statistics of the consumption of lumber and timbers, including imports, converted from cubic feet to board feet in the ratio of 1 to 8. Fuel and other secondary products are not included.

CHANGES IN LUMBER PRODUCTION AND PER CAPITA CONSUMPTION.

This figure, while conservative, can not be given too much weight because of the many uncertain factors in such an estimate. There can be no question, however, that lumber has lost heavily in the markets of the United States within the past 10 years. This is made evident further by decreases both in total lumber production and in its consumption per capita. The following table gives from 1904 to 1915, inclusive, the reported cut of lumber and the number of mills from which returns were obtained, the total estimated cut of lumber, the imports and exports of lumber, and the net estimated consumption in the country per capita:

Year.	Cut of lumber reported.	Number of active mills reporting.	Estimated total cut of lumber.	Imports of lumber.	Exports of lumber.	Estimated per capita consumption of lumber.
	M ft. b. m.		*M ft. b. m.*	*M ft. b. m.*[1]	*M ft. b. m.*[1]	*Ft. b. m.*[2]
1904	34,135,139	19,127	43,000,000	805,614	2,368,483	493
1905	30,502,961	11,666	43,500,000	901,407	2,117,067	494
1906	37,550,736	22,398	46,000,000	1,219,069	2,202,232	516
1907	40,256,154	28,850	46,000,000	1,231,465	2,503,752	504
1908	33,224,369	31,231	42,000,000	1,026,515	2,356,486	450
1909	**44,509,761**	**42,041**	**44,509,761**	1,071,391	2,110,339	473
1910	40,018,282	31,934	44,500,000	2,019,220	2,517,622	470
1911	37,003,207	28,107	43,000,000	2,036,969	2,977,557	442
1912	39,158,414	29,648	45,000,000	2,083,174	3,068,807	455
1913	38,387,009	21,668	44,000,000	2,278,040	3,387,499	436
1914	37,346,023	27,506	40,500,000	1,892,410	3,123,954	388
1915	30,985,473	16,248	38,000,000	1,605,846	1,502,409	375

[1] These figures exclude staves, heading, shingles, lath, shooks other than box, logs, and hewn timbers. They include 20 per cent of the railroad ties exported, this being the proportion of sawed ties used in the United States; also the imports and exports of lumber reported by value rather than quantity. These have been converted to footage by using the average values of the imports and exports, respectively, for which both quantity and value are reported.

[2] The estimate of per capita consumption is based upon: (1) The 1910 census of population, showing 91,972,266 people in the United States; (2) the assumption that the yearly increase in population has maintained the same volume as from 1900 to 1910, or approximately 1,600,000 people annually.

The most accurate record of lumber cut was obtained in 1909 by the Forest Service and Bureau of the Census, when 49,738 sawmills, operating or idle, were accounted for. The reports for the other years cover a much smaller number of mills, although including nearly all of the larger plants which produce the greater part of the total cut. Undoubtedly, the reported cut before and since 1909 is less than the actual volume of lumber manufactured, by reason of operating plants whose cut was not obtained. An attempt has been made to approximate the total cut of lumber from 1904 to 1908 and in the six years following 1909 in the light of known trade conditions as compared with that year. There can be little question that production dropped in 1911 and again in 1914–15, from the number of small mills known to have suspended cutting, aside from the curtailment at many large plants.

No precise accuracy is claimed for the estimates of total lumber cut. The important point is the general movement of lumber production and per capita consumption. With a stationary or decreasing cut, a steadily increasing population, and a gradual increase in lumber exports, there is no doubt that the peak of consumption was passed in 1906 or 1907, and that the per capita use of lumber in the United States has been dropping ever since. The estimated decrease from 1906 to 1915 is 141 board feet. If the 101,572,000 people supposed to be in the United States in 1915 had used lumber at the per capita rate of 516 feet prevailing in 1906, the total consumption would have been some 14 billion feet greater than the amount which appears to have been actually used. Aside from the estimated replacement of about 8 billion feet of lumber by other products, there has undoubtedly been some reduction in the per capita consumption of all structural materials, which has affected the use of lumber.

Not only has the lumber manufacturer lost a part of his old market; competition with other materials tends to limit increases in lumber prices and large increases in lumber output for the old channels of home consumption.

These facts have two important bearings. The first is in relation to the need for carrying large stocks of timber without immediate exploitation. The idea common in the West that lumber manufacture can be expanded indefinitely is not sound. Expansion in the manufacture of forest products in regions of large timber resources will depend upon the growth of their own population and of their agriculture, ship building, and other industries; upon building up their foreign trade; upon replacing other regions in supplying present markets; upon developing new uses of lumber and new or specialized forms of service to consumers; and upon the use of timber for other products than lumber.

The second point is that for many common structural uses the competition of other products will aid in protecting the public against unreasonable lumber prices. A general monopoly of lumber could be but partially effective unless it embraced other major structural materials.

All of this does not mean that the United States can afford to waste its timber. Other uses of wood are increasing in volume and importance. The available supply is decreasing steadily since the present cut for all purposes is more than the growth of the forests. The best guarantee of reasonable prices for forest products in the future lies in economical use of the present surplus and in producing new timber crops on cut-over lands.

THE BURDEN OF STANDING TIMBER.

The very abundance of timber itself—taken into private ownership in too large quantities and capitalized too highly—weakens the lumber industry through its pressure upon the mills. It now seems clear that holding the great stumpage surplus of the West should have rested with the public. The present difficulties of western lumbermen thus are partly the outcome of too liberal a disposal of the public lands.

The second cause of weakness in lumbering is the vast footage of standing timber which the industry assumed and partly overcapitalized in the days of confidence. Although a factor of relatively less importance in the southern pineries, obligations to pay interest on bond issues and the principal of maturing bonds keep up a pressure for the steady running of mills which leads to periodic overcutting. Four-dollar longleaf pine stumpage in 1914 will become $7 or $8 timber by 1926 and $13 or $15 timber by 1938 if the present tax costs and simple interest at 6 per cent are to be returned. With many operators capitalizing their holdings on these terms, often indeed carrying a large volume of 6 per cent loans secured by their timber, the cut of lumber tends increasingly to be governed by these financial requirements rather than the demands of the market.

In the Northwest the "heavy load" of stumpage is at the bottom of the situation. Its three principal forest regions contain some 888 billion feet of privately owned timber. Their yearly cut has never exceeded 9 billion feet. This timber represents a present capitalization of about $1,100,000,000. Its reduction by the present limited rate of cutting is probably more than offset by actual outlays for taxes and interest on what is left. Realization upon these vast investments lies with the future, subject alike to its uncertainties and its possibilities. Upon it rests a burden of increasing cost in carrying timberland.

The calculation of expected returns at interest rates which double the value of stumpage at 8, 10, or 12 year intervals leads to future valuations obviously unreasonable from the standpoint of what the industry may expect to realize or the consumer be willing to pay. Adding 6 per cent simple interest to taxes and protection charges would bring the $1.50 Douglas fir timber on the West Coast up to $3 in 1927 and $12 in 1951. California pine holdings now averaging around $1.90 per thousand feet would attain a value of $3.80 in the first period and $15.20 in the second. And 1951 will still see a deal of uncut virgin timber in the northwest.

Various factors will moderate these increases. The most accessible and heavily capitalized timber will be cut first. The back stumpage, which will be held the longest, is cheaper and will not mount up as rapidly in cost. Furthermore, taxes and protection costs may not increase in the future proportionately with rising timber values. It may prove possible to offset carrying charges in part by developing current revenue from grazing live stock or leasing sites for resorts. After all has been said, however, reconstruction of timber valuations and expected returns on a sounder footing appears a necessary although difficult task. One feature of this reconstruction should be to strengthen the productive industry by separating surplus timber from timber logically joined with operating plants.

Carrying timber is the more difficult because of the unsound financing of many stumpage investments, the large amounts of borrowed money which have gone into them, and the number of owners who are under pressure for immediate returns. The movement to "unload" stumpage while opportunity for some profit exists is the most serious cause of overproduction in the West. The market for stumpage is very limited. Transfers during 1914 and 1915 were restricted practically to blocks advantageously located for cutting by some mill or logger and to forced sales made at a sacrifice. But few purchases of stumpage to hold as an investment are being made. The outlet for liquidating timber investments is thus reduced largely to manufacture. Mills have been constructed solely because timber owners can no longer pay taxes and interest on their stumpage without income from it. Other mills do not curtail their output in the face of obviously glutted markets because tax, interest, and maturing bond obligations must be met. In other words, the very resource which should have been one of the great economic advantages of the country has, through speculation and overrated returns, become the heaviest burden of the lumber industry.

The experience of the past 20 years and particularly the acute conditions of the past 5 years bring out strikingly the difficulties of carrying the enormous timber reserve of the West in private ownership. This form of ownership must be credited with public and economic service through its large contributions to the support of local government and of community institutions and improvements and, in the main, through its general and increasingly efficient protection of forest resources from fire. It has promoted a remarkable industrial development and has been the principal source of economic growth in many sections. But it has fallen down in its speculation, its financing, and its wasteful use of the forests. This is indeed the natural, human side of such great dynamic movements as the rapid settlement and development of the West. It has been the "way" of the fast-growing, unconservative West in many of its activities. But its after effects, an overload of capitalization, the threat of too early depletion of the standing timber and no certain provision for regrowth, must now be reckoned with. This is the price which the United States has paid for the means used to develop its new States.

The bad economy of turning over enormous public timber resources into private hands at any such rate or on any such scale as during the 50 years following 1860 thus seems evident. The immediate result was speculation and the reaping of unwholesome profits, with little or no productive service to either the country or the region. To a large extent these profits have not inured to present timber owners, but to others who sold out and disappeared from the field. The final result is burdening the lumber industry with an enormous load of highly capitalized raw material, which it must sacrifice in part because of its own financial exigencies, without real benefit to itself and to the loss of the country.

Undoubtedly means should have been provided for the acquisition of public timberlands in the West to any extent required for agricultural or other local development or for the supply of sawmills as fast as the lumber market permitted their construction. There can be little question, however, as to the bad results of the public's passing title so rapidly to enormous quantities of stumpage for which there can be no immediate demand. The carrying of this future reserve should have been a public, rather than private, function. Holding raw material for exploitation 20, 30, and 40 years hence is difficult for private ownership under the most favorable conditions. In other words, for one of the underlying causes of weakness in the lumber industry we must go back to the public land policy of the United States in disposing of its western timber.

THE CHARACTER OF THE INDUSTRY ITSELF.

Lumbering has been an industry of the wilderness, broken up by the nature of its raw material into thousands of isolated units. Its strength has lain in mechanical skill and energy; its weakness in lack of economies and poor merchandising.

Easy profits on timber have spoiled the lumberman for painstaking development of his manufacturing business and his markets. The opportunities offered for small enterprises and for speculation have brought too much inexperience and unsound financing into the industry.

Withal lumbermen have grown up apart. Difficulty in thinking alike has handicapped the industry in recognizing changes in its markets and adapting its business to them. A reconstruction must now be faced, destructive in many phases but in line with natural growth.

A third reason for the troubles of lumbermen is to be found in the character of the industry itself.

Lumbering is perhaps the most "American" of our manufacturing industries. In its individualism, its encouragement of small, independent business units, its hearty competition, and the rugged, forceful qualities which it has derived from contact with hard physical conditions and problems, it expresses many national economic and social ideals. Its failings are those which go with this type of industrial enterprise. They are, in fact, common to many American industries and in part expressions of national characteristics.

Lumbering has been thus far a primitive industry. It has had to deal primarily with natural conditions and forces—the wilderness with its forests and rivers, the winter snows and spring freshets essential to its operations, the transportation of heavy materials in enormous quantities by rough and ready but effective engineering methods. It has developed a type of business executive capable of handling labor and meeting physical conditions effectively, but largely without expert training, not skilled in finance, in the finer points of organization or economy, or in merchandising. Close economies and exact business methods were unnecessary in the early stages of lumbering because liberal profits on timber usually made up for any waste or loss in manufacture; hence they were overlooked. This has given a cast to the development of the industry which it has been slow to overcome and which has handicapped it in meeting the more difficult business problems of the later years.

The industry has thus been slow to develop the intensive, exact business practice required by modern conditions. It has shown remarkable capacity in perfecting logging and manufacturing methods and adapting them to diverse, often exceedingly difficult, conditions of timber and topography. But, broadly speaking, while the lumbermen of succeeding decades have made wonderful strides in engineering and mechanics, they have not progressed in any like degree in the mastery of complex, highly organized business.

This is probably due, as much as anything, to a mistaken attitude toward their product. Lumber has been looked upon largely as a necessity which would sell itself with no great effort on the part of the manufacturer. The average lumberman has regarded his work as done when the timber was logged to his mill and sawed into boards. This is another inheritance of the early days when lumber sold readily and money was made easily, which the industry has been slow to outgrow even under the stress of overcut markets and growing competition with many substitute materials. Hence the lumber industry has been weak in its merchandising, its advertising, its knowledge of the uses and competitors of its own products, its attention to the needs of consumers, and its study of new forms and uses of lumber. It has given insufficient attention to the grading of its product in relation to consumers' requirements, to the maintenance of uniform quality in grades, and other points of good service which have featured so largely in the development of modern business.

Lumbermen, on the other hand, have had their minds too constantly upon timber and the profits to be realized from investments in stumpage. So much "easy" money has been made in quick turns of timberland and in manufacturing stumpage which was bought at low prices that a profit on timber came to be regarded as an immutable return of the industry.

One of the vital weaknesses of lumber manufacture has been its close alliance with timber speculation. To a degree this has been unavoidable, as the nature and cost of sawmills make necessary an assured supply of timber for several years' operation. The connection, however, has gone far beyond this sound economic relation. Often it has made lumber manufacture the tail of the dog, existing not as a business in itself, conducted on its own merits, but solely as a means of getting rid of timber when speculative interests dictated. The operations cited in this report bear common testimony that the bulk of the past profits in lumbering have been made on timber investments rather than in manufacturing. This relation has tended to divert the hard thinking and progress of the industry from the field of intensive manufacture and merchandising, in which many other industries of the present day have had to win their right to live.

Lumbering, furthermore, has in the past offered almost unequaled opportunities for men with little capital and for successful speculation. The success of many manufacturers who began in a small way has encouraged others without adequate experience or capital. Heavy borrowing upon insufficient security and for businesses insufficiently established has been common. The same spirit of optimism has led to much unsound financing, including the excessive capitalization of assets. Inexperience and inadequate capital combined have launched an overlarge percentage of inefficient operations.

Finally, probably the most striking characteristic of the lumber industry is its lack of cohesion. This is partly the result of the physical conditions under which the industry works. Its raw material is widely spread out, of great weight and proportionately low value. The shipping of logs for manufacture is necessarily limited to short distances, and a large number of scattered sawmills is unavoidable in the nature of things. Timber, in other words, can not be assembled like petroleum or live stock at comparatively few points where manufacture is concentrated.

With their businesses developing separately in widely scattered, often isolated regions, and with men coming into the industry without common training and differing widely in experience, strong individualism has always been characteristic of lumbermen. There has been the greatest diversity among them as regards capitalization, business methods, policy, and point of view toward current conditions. Hence the industry, in spite of a great deal of effective association work, has been backward in developing common ideas about its problems. It has been backward in recognizing new conditions or studying changes in its market. It has been behind many other industries in such undertakings as the opening up of new markets, the adoption of better merchandising methods, and the development of by-products. Many cooperative enterprises have failed from lack of general appreciation of their need and of adequate support. The industry has been handicapped also in developing greater stability by lack of clear definition, or at least of a clear-cut general understanding, of the limitations upon cooperative effort imposed by State and Federal laws.

One of the best illustrations of this diversity within the lumber industry and its lack of common conceptions and policies is the reaction of different manufacturers to a depressed market. Some operators meet it by curtailing their cut; others by running double shift in an effort to decrease cost of production. Behind such divergent methods lie, of course, differences in financial organization and in ability to weather hard times.

Unquestionably one of the fundamental causes of the periodic overproduction of lumber is this lack of common understanding of the situation and of a general conception of the effective way to meet it. Another cause is the divergent individual interests of various operators differently situated. The market for lumber has changed radically within 20 years. The industry has been unable to adapt its production to this change, partly because of its burden of capitalization in timber and mills, partly because divergent interests have dictated different courses to different manufacturers, and partly because it is so unable to pull together that there has been little effective cooperation in studying or meeting the changed conditions.

With all that has been said of the tendencies among lumbermen to pull apart, it must be pointed out that the industry has been successful in some cooperative enterprises, particularly in a number of selling agencies, in the development of manufacturers' associations, and in recent advertising and trade-development campaigns undertaken on a considerable scale. In other words, there are excellent possibilities of self-help within the industry.

A RECONSTRUCTION UNDER WAY.

Lumbering in the far West, with its enormous quantities of virgin timber and its dependence chiefly upon distant markets, has advanced well into the stage of large-scale production. Its mills and logging organizations have become progressively larger. Plants cutting their 50 million feet or more yearly are common. Competition has tended to eliminate the smaller mills whose operation is often less efficient or to reduce them to a minor place in the industry. Many relatively small plants have persisted, however, for the supply of local communities or the cutting of rough products like timbers and railroad ties or, indeed, as a competitive factor in the general trade.

This change has been forced sharply and abnormally by low returns on lumber over considerable periods. Within the past two years small and medium sized operations have been forced out of the industry at a rate too fast for normal devolpment. Not only was there much loss of property, but a more serious loss in the spirit and driving human force behind the industry. The change came fast and cut deep. It has struck hard at the individualistic, democratic character which lumbering has had to a marked degree.

Western lumbering is not fully prepared for the changes forced rapidly upon it. Adjustments in ownership and business organization toward greater efficiency come slowly. The changes now taking place are in line with natural economic development. But they involve serious losses on the human, individualistic side of the industry and force upon it problems of sudden reconstruction which are difficult to meet.

Notwithstanding the acute character of many of these difficulties, the very facing of them is of undoubted benefit to the lumber industry and an experience which sooner or later it was bound to undergo. It is forcing the industry to shake itself together, to eliminate its unsoundness, and to improve its service to the public. The changing attitude of lumbermen toward standing timber and focusing of effort upon manufacture are the most desirable features of this development.

HOW THE PUBLIC IS CONCERNED.

The labor and economic welfare of many communities where lumber is a mainstay have been hard hit by its enforced curtailment and low returns. But the greatest public loss in the long run is the waste of timber caused by cutting beyond the wants to be supplied and by inability to use a considerable part of the stumpage destroyed. No public gains, like the extension of agriculture, offset this loss of a natural resource.

Abundant forests have been one of the great assets of the United States and its best guaranty of cheap lumber. Their depletion, to no public or industrial advantage, is a national waste which bids fair to be felt sooner or later in the cost of forest products.

At the same time the public has gained something from the better service forced upon the industry by its hard times.

LOCAL EFFECTS OF INSTABILITY.

In 1913 western Washington produced about 4.25 billion feet of lumber, which sold for an average price of $13 per thousand feet. In 1915 the cut was reduced to approximately 3.6 billion feet, and the price to $10. In the first year $55,250,000 was available for distribution from the manufacturing industry for wages, supplies, interest, added capital, etc., reaching almost every industry, bank, and community in the State. In the latter year this sum was cut over one-third. It is noteworthy that approximately 60 per cent of the lumber price received by manufacturers is paid out directly in the form of wages. The reduction in lumber output and the shrinkage in wages on the cut of 1915 meant probably a decrease of $7,000,000 or $8,000,000 in the lumber pay rolls of Washington. Severe losses fell also upon the businesses and industries largely dependent upon lumbering.

Lumber manufacture employs 10.5 per cent of the wage earners in all manufacturing industries of the country. In many sections of the West and South it is the leading industry. It carries 63 per cent of the labor employed in manufactures in Washington and Idaho, 52 per cent in Oregon, 66 per cent in Mississippi, 60 per cent in Louisiana, and 20 per cent in California. Reductions in wages and heavy reductions in the employment of labor have taken place in all of these regions during the last three years under the exigencies of depressed lumber markets. Community losses resulting from heavy reductions in lumber output have been widespread. Particularly where lumbering is the dominant industry, as on the West Coast, where the whole economic structure of the region is built up largely within and upon it, and where there are no other large industries to equalize conditions, do such hard times react critically upon labor and all business and community life. Unemployment becomes serious. The failure of many sawmills causes bank failures and the widespread upsetting of business and financial security. Worst of all perhaps is the demoralizing effect of wholesale failures and business instability. Recklessness on one hand and lack of confidence on the other cut deeply into the economic well-being of large regions and large numbers of people.

These, of course, are but phenomena of hard times common the country over. The difference in the case of lumbering is threefold. First, the ill adjustment of the supply of raw material as now carried to the demand for manufactured products is more serious than in most industries and makes lumbering peculiarly susceptible to severe depressions. Secondly, the economic dominance of lumbering in the regions containing the bulk of the country's timber makes the community effects of its difficulties exceptionally acute. And such community distress is the more serious because of the exceptionally large proportion of the returns in lumbering, as compared with other manufacturing industries, which are paid out in the form of wages and for foodstuffs and other supplies furnished largely by the immediate region.

WASTE OF FOREST RESOURCES.

More permanent in its bearing upon public interests is the effect of the weakness in the lumber industry upon the utilization of standing timber. Lumber production under 1914 and 1915 conditions involves timber waste in three forms. First, timber is cut in advance of an economic demand commensurate with its utility, which might better be left until the country needs it; second, the trees felled are but partially utilized, and large amounts of low-grade material are destroyed in the woods or mills; and third, inferior species in the forests are wholly or partly left uncut.

The first element of waste results from cutting lumber solely on account of the financial difficulties of timber or mill owners and then forcing it upon the market at a sacrifice price, often less than the cost of production. Such lumber supplies no adequate economic demand. It often represents not competition in manufacture but competition in unloading burdensome timber holdings, a patent ill effect of the close connection between sawmilling and speculation in timberlands. Hence results a surplus of stock over demand, to be gotten rid of like the "transit" cars of lumber shipped into Chicago by the hundreds during 1914 and 1915 and sold on the way or after arrival for whatever they might bring.

Sidelights on this situation will illustrate the waste of overproduction. Some operators on the West Coast with rafts of high-grade fir logs in their mill ponds which in good times are manufactured largely into flooring, stepping, silo stock, and other high-quality products worth probably $20 per thousand feet, in 1914 and 1915 cut such timber into railroad ties and other cheap products at $8 per thousand or less, because this was the only business to be had at the time, and because of physical or financial inability to carry large stocks of logs until a better market was available. A yellow-pine company in the South, during the winter of 1914–15, burned 2,000,000 feet of No. 4 boards under its boilers, because there was no longer room to carry this material in its yards. Another large operator dumped from 2 to 3 per cent of the entire cut into the waste burner because yard room was exhausted. And many companies the country over experienced excessive losses from deterioration of lumber in their yards, on account of the extra stock on hand and the unusually long periods during which it had to be carried before sale was possible.

The second element of timber waste—due to poor utilization of the trees felled—is more definite. Greater or less waste of this character has been inherent in southern and western logging because of the lack of diversified wood-using industries and the heavy freights to large markets, which preclude the shipment of material of low value. Even under more normal conditions, as in 1912–13, southern and western loggers leave from 20 to 30 per cent of their timber in the woods, which would be put to use for box lumber, cooperage, etc., in eastern Pennsylvania or central New England. During such unfavorable markets as those of 1914 and 1915 this waste is more serious. The disposal of low grades, which usually form 30 per cent or more of the lumber cut, becomes increasingly difficult. Operators, seeking as quick sales as possible and some margin between cost and returns, restrict their cut more largely to the higher grades which usually are most salable on a dropping lumber market. Increasing quantities of low-grade logs are left in the woods.

Lumber manufacturers are too unlike in their analysis of such problems to have evolved a consistent policy in meeting a situation of this kind. Inexact knowledge of operating costs in manufacturing the various grades usually prevents a precise adjustment of cut to market conditions. Many operators make no changes at all in their logging practice and others do so only in a general way. In the case of eight yellow pine mills, however, whose operations were reviewed, instructions were issued for the leaving of cull logs and logs cutting chiefly No. 3 and No. 4 common lumber in the woods, which involved a further waste of from 1 to 25 per cent of the standing timber as between the 1913 and the 1915 markets. It is probable that similar waste in Douglas fir operations, through leaving low-grade logs in the woods, has increased 5 per cent or more.

The third element of waste takes place in the species of trees found in nearly all forests which are of lower value than the principal commercial timbers because of poor standing in the trade or because they yield mainly low grades, and hence can not be cut or can be cut only in part when the market is off. In many parts of the East, the leaving of such species, like balsam and hemlock in the early logging of the north woods, has not meant a loss since they were taken out in later cuttings. Often, indeed, they have been of value in restocking cut-over lands, even though with inferior species. The same result will be attained under regulated cuttings on National Forests in the West, where a large volume of both choice and inferior timber is often left for restocking and future logging. In western operations on private land, however, the bulk of any timber not removed is destroyed in the slash fires which usually follow logging or will deteriorate so largely before a second cut is practicable that it can not be credited as a future forest resource.

The usual waste of about 26 per cent in the Inland Empire has thus been largely increased through leaving inferior species uncut altogether. A probable waste of 15 per cent or more from this source is involved in the continuance of demoralized lumber markets. The same is true of California where, under 1915 conditions, but a small portion of the white fir, Douglas fir, and incense cedar which occur throughout the pine forests could be marketed at a profit. Waste from these sources is liable to increase in the absence of favorable prices, as the lumber industry studies its problems more intensively and applies to them more exact standards of cost and returns. On the other hand, the development of by-products should in time permit closer utilization of timber and, indeed, afford a more profitable outlet for some of the low-grade material now manufactured.

Continuance of the conditions characteristic of the past two and a half years means, in brief, a material and unprofitable drain upon the forests of the country, due (1) to premature cutting dictated by the financial exigencies of owners rather than the demands of the market and (2) inability to use the trees cut or to use all species of timber closely. Concretely, this means that a materially larger area of timberland is cut over and a materially larger part of the timber surplus of the country is used up during each year like 1914 or 1915 than is required to supply the country with wood. Closer use of the cut from a smaller area each year would give the public the same service from our forests.

The rapid using up of forests in new regions is not necessarily wasteful from the standpoint of the public. The clearing and burning of timber to make room for agriculture is a case in point. But it is difficult to conceive how the public gains now from any standpoint through further forest depletion beyond supplying real needs for timber products or maintaining sound industries which contribute to the economic strength of the country, as in its foreign trade. Hundreds of thousands of acres of the finest agricultural soil yet untilled in each of the forest regions is now idle stumpland. The vast economic interests centering around the conservation of water are questioning the wisdom of the forest destruction which has already taken place. Aside from future needs for lumber, wood is being recognized more and more as fundamental organic material from which many products necessary to present-day life may be procured—paper, cheap industrial fuel, distillates of many kinds, and the like; their number is constantly increasing. Taking the situation in toto, there can be no question that the welfare of the public weighs heavily for conservative use of the timber supply.

LUMBER PRICES AND MERCHANDISING SERVICE.

It must not be overlooked that instability in the lumber business has not only kept prices low but has given the public better service from this industry. The pressure of necessity and of rigorous competition both within the industry and with substitute materials is reducing the cost of making lumber. Manufacturers have been forced to study more closely the needs of consumers and the possibilities of improving methods of distribution. Lumbermen have been shaken out of their complacent assumption that boards are a necessity and will sell themselves. They are realizing that satisfactory returns can not be expected without satisfactory service to the public.

COST OF LUMBER TO CONSUMERS.

An abundance of timber has been one of the great economic advantages of the United States. It has supplied without excessive increases in cost many sections, like Pennsylvania and New England, whose own forest resources have become inadequate for their own needs. It has furnished at low prices one of the stable necessities for developing large prairie regions without timber of their own. It has contributed to the exports of the country, and it has maintained competitive conditions and moderate prices in the lumber trade.

Lumber prices have been lower in the United States than in many other countries of like development because of the abundance of its natural forest resources. No other competitive factor can take the place of a timber surplus as a guarantee of cheap lumber. Other structural materials compete with wood largely from point of service rather than cost, and then only in certain of its many uses. In the wide field of lumber consumption, in the town, in the factory, and on the farm, nothing will prove so effective in protecting the consumer from unreasonable prices as a large supply of standing timber.

The United States needs all the timber which it has. Region after region has cut the bulk of its timber, ceased to ship lumber into other States to any extent, and become partly dependent upon outside supplies for its own needs. Local timber shortages are already matters of fact, as evidenced by higher local prices for lumber. That these have not developed into real timber famines is due to the availability of forest resources in other parts of the country. The last great reservoirs of virgin timber are now being drawn upon—in the South and West. It seems probable that the capacity of the southern pine region to supply more than its own local consumption will be limited to 20 or 25 years. More general use of western timber, except some of its higher grades, will come about only as the cost of longer freight hauls can be made good out of advancing lumber prices. Furthermore, the lumber cut of the West can not be greatly increased without exceeding the growth of its forests and thus limiting the life of its supply; and the increasing demands of its own local population and industries will restrict the amount available for other parts of the country.

The concrete index of these changes will be the average price of lumber. The certainty of moderate prices for the country as a whole rests primarily upon (1) the available supply of timber and

(2) its distance from the consuming centers. The United States must change its basis of supply from drawing upon the stored-up timber in virgin forests to current production as in the case of farm crops. This change is almost sure to be accompanied by increases in the cost of lumber and other products whose raw material is wood. Unreasonable increases in price during the readjustment will be checked most effectively by careful husbanding of all standing timber and the application of forestry to start new crops. The unnecessary using up of the remaining supply of timber now, through the weakness of the lumber industry, thus threatens the public with high prices in the future.

There is another danger in the situation. Prolonged periods of overproduction involve the greater or less liquidation of investments, the failure of many plants, and the dropping out of mill and stumpage owners. This is partly a necessary process related to economic efficiency. But the weeding out may be too fast and go too far. It may lead to conditions favorable to partial monopolies. Tendencies toward larger producing units in the Northwest are growing out of the present situation. Within the limits necessary for genuine competition, they appear desirable in the interests of stability and efficiency. But it is possible that the demoralization of values and elimination of individual owners may go so far as to prepare the way for partial or local monopolies.

A nation-wide forest monopoly is doubtless out of the question. Timberland is too widely distributed in many parts of the country and its ownership split up in too many hands, particularly in the case of second-growth areas. The competition of substitute materials and of public stumpage holdings would further prevent the creation of an effective nation-wide timber trust. Nevertheless the concentration of timberlands and manufacturing plants, more or less localized, to a degree sufficient to permit partial control of prices in particular regions or as to particular classes of products, is a possible outcome of the very weakness now evident in the industry. The creation of such monopolies would be most feasible through the control of diminishing supplies of virgin timber in regions where stumpage ownership has attained a large scale. Even localized control of virgin stumpage might be effective in monopolizing certain of the higher grades of lumber with which neither substitute materials nor second-growth timber can compete successfully.

THE INTERESTS OF LABOR.

It has been brought out before that the forests of the United States furnish more employment to labor than any other manufacturing industry, and that the element of wages in the cost of producing lumber is exceptionally large. Aside from securing stable conditions now, which will protect wages and employment, labor has much at stake in perpetuating a supply of raw material for forest industries in the future. This interest is common indeed to practically all elements in the economic life of the country.

THE RENEWAL OF FOREST RESOURCES.

The instability of the lumber industry creates another and a most important problem which the public must face—the renewal of forest resources as virgin timber is exhausted. In the Eastern States where markets are varied and prices high, forest production has been fairly continuous on some private lands; and economic conditions are making it possible for the private owner to hold cut-over areas for future production. But the unstable conditions in the West and South make it difficult for the lumber industry to restore the forests which it is destroying.

The practice of forestry, with a sustained growth of timber, will come about mainly through public initiative and effort. But reasonable regulation of the handling of private forest lands should have a place in this development. Owners should be required, for example, to aid the restocking of cut-over lands suited to forestry by protecting them from fire.

WHAT THE SITUATION CALLS FOR.

GREATER EFFICIENCY IN THE PRODUCTION AND MARKETING OF LUMBER.

Better financing and accounting is perhaps the first step, by and large, in putting the productive end of the lumber industry upon its feet. It seems, too, that cost and waste can be saved through better equipment and technical methods and through more effective handling of labor. Merchandising has its opportunities, particularly in more direct distribution and in making the manufacturer, in one way or another, a factor in retailing his own products. And there is promise of future economies through closer use of the raw material for many by-products.

Such progress lies with the individual operator. Large producing units have obvious advantages, particularly in the opportunity for specialization in the many departments of forest industry. The trade association also has a legitimate place in accomplishing through cooperation what most lumbermen can not do single handed.

Cooperative marketing appears desirable in the reconstruction of the lumber industry, especially in foreign trade and in selling the products of small mills.

Any of these forms of trade cooperation may, through abuse, become instruments of monopoly. The public should not, for that reason, turn its thumbs down on developments necessary to an efficient industry. They should rather be safeguarded against abuse by the control of public agencies and by publicity. Systematic publication of wholesale and retail lumber prices is a desirable step to the same end and would help to make lumber marketing open and stable.

IMPROVED BUSINESS METHODS.

It may be of service to indicate, even at the risk of being charged with irresponsible criticism, what appear to be necessary and practicable changes in business methods to make the production and distribution of lumber more efficient. In offering such suggestions it is, of course, necessary to deal with the industry and its characteristics in the broad. They deal primarily with the business of manufacturing lumber, aside from the large problem of putting that business upon a sounder footing by separating it from the ups and downs of timber speculation.

A fundamental need of lumber manufacturers is more adequate capital and sounder financial footing. These lacks have been responsible for many of the worst features of recurring demoralization—enforced cutting beyond the requirements of the market, to pay interest or retire bonds, inability to hold lumber stocks during slack demand, enforced sales, indiscriminate price cutting, transit car shipments, and the rest. Probably no other single thing would strengthen the industry so much as to release it from these evils arising from lack of capital or an overload of obligations to borrowed capital.

The financial footing of large numbers of industrial units can be strengthened in the long run only through reasonable earnings on their operations. The essential thing which the lumber industry and its financial backers should realize is the need for using its earnings to reduce debts and strengthen capital instead of expanding in one form or another on narrow margins. The kind of financing which used earnings largely to acquire more timber while borrowing heavily at 6 to 8 per cent for operating purposes is at the bottom of much of the present weakness of the industry. The need for greater financial stability is a factor which should be considered also in the reorganization of embarrassed plants.

Reduction in the excess mill capacity to a normal margin stands out as a necessary step toward stability. Competition may aid in bringing this about through eliminating the less efficient plants. But in the long run it can be assured only by greater technical and financial strength in the industry as a whole.

Cheaper banking and bonding service is an important feature of financial strength. This can be expected as more stable conditions are brought about in lumber manufacture, and as timber and mill investments acquire better standing as long-term securities. Industrial stability will react upon interest rates and lower rates in turn will promote stability.

Directly in line with sounder financial organization is the need for sounder methods of accounting. Its obvious value is to sharpen all operators on their costs and returns, and to show them at what prices they make or lose in handling particular grades of material. Sound accounting would go far both in restraining sales at less than the cost of production and in directing the energies of operators to the reduction of cost items which are excessive. To this end, and in line with one of the distinctive modern developments in other businesses, it is desirable for the industry to develop standard accounting systems.

A second need of lumber manufacturers, taken in the aggregate, is more efficient equipment and technical methods. This is related again to adequate financing. Many mills are unable, for lack of capital or of net earnings, to install improved equipment which would reduce their operating costs or enable them to obtain a higher value out of their logs.

The average mill in each region is considerably below the standards of efficiency already demonstrated by the more progressive plants as attainable. The wide range in operating costs, even under similar physical conditions, is striking evidence of the divergence in efficiency and the lack of fully developed standards of equipment and methods.

The industry as a whole needs to give closer scientific study to its technical processes. Studies conducted at a number of sawmills by the Forest Service indicate that there is an average loss in seasoning softwoods of 6 per cent, and in seasoning hardwoods of 9 per cent. These losses amount annualy to about $33,000,000. They can be eliminated in part by scientific study and control of the temperature and moisture conditions involved. Other losses occur in sawing logs for maximum quality of output, in manipulating secondary mill equipment, and in surfacing. Data obtained at a number of plants indicate, for example, a loss of 1.21 per cent in trimming uneven board lengths down to the even lengths commonly handled in the trade. With all the necessities of custom and trade requirements behind these practices, the industry should be outgrowing a stage where such gross losses are permitted.

It is believed also that the industry as a whole can add to its efficiency in no small degree by better handling of its labor. With 60 per cent or more of the final cost of lumber consisting of wages, the possibilities of cheapening production through more effective direction of human energy are much greater than in the average industry. The conditions under which men are employed, particularly in the logging camps, in respect to sanitary and attractive surroundings, opportunities for recreation, and incentive to individual effort, are often very poor. Inexperienced, discontented, and shifting labor is a serious handicap at many logging camps and a frequent source of high costs. Similar though less extreme conditions exist at many sawmills.

The third great need of the lumber industry is better merchandising of its product. This calls, first, for better advertising of lumber and the products manufactured from it and for the systematic development of domestic and foreign markets. It calls, secondly, for better salesmanship in selling lumber to the people who actually use it. Retailers should be aided by the manufacturers in advertising and selling their wares and in educating consumers in the uses of lumber, as the manufacturers of many other products aid their distributors with special advertising, demonstrations, and the like. Lumber has lost ground because it has failed to meet competition of this kind; and retailers, following the most profitable course, have sold the products whose sale was made easiest for them.

Large reductions in the cost of distributing lumber appear uncertain. There are tendencies, indeed, for distributing costs to increase More intensive advertising, demonstrations of lumber products, trade development, etc., are called for by present-day merchandising, and especially by competition between wood and other structural materials. Saving can doubtless be effected in the cost of wholesaling lumber by more general cooperative marketing. The fundamental elements of cost in lumber retailing, however, the labor and other charges for rehandling, loading, delivery, and storage, probably can not be greatly reduced simply by changes in retail organizations. The same applies to the heavy cost of transportation. Selling lumber direct from sawmill to consumer has progressed slowly, except in the case of large buyers like railroads and factories and in a small volume of local trade.

The greatest promise in this direction appears to lie in manufacturing finished products at the sawmill as far as possible in their final form and supplying the consumer or small dealer with a varied stock of rough and finished products in one shipment, the so-called "mixed car." Aside from facilitating direct trade, manufacture into finished forms, like doors or window sash, at the sawmill is in the interests of economy through eliminating transportation costs on waste material. Other economies which do not depend upon lower-priced labor may be brought about. There are too many retailers in many localities, with an uneconomical duplication of investments and fixed charges.

The following methods have been developed or proposed to accomplish more direct or efficient distribution of lumber, or to relate its distribution more closely to the interests of the manufacturer:

(1) A series of "line yards" connected with sawmills and under the same management. These have certain advantages in manufacturing and marketing the products of a particular mill or region more intelligently in relation to the needs of groups of consumers and in developing markets for special products.

(2) Selling lumber on a cash basis only, to eliminate the cost of carrying credits.

(3) Farmers' cooperative yards, distributing lumber at cost or a low rate of profit.

(4) Selling lumber, ready-cut houses, etc., by mail orders and catalogues.

(5) Retailing small quantities of lumber at stores to develop a class of trade not usually reached by the lumberyard.

Each of these methods possesses its own advantages and possibilities, often in reference to certain classes of consumers or particular demands of the public. Each appears desirable as a competitive factor in lumber distribution in both cost and service. Cooperative yards, with their low charge for profit, have perhaps the greatest promise in this direction, but may be limited in their field of development.

Unquestionably it is desirable for the manufacturers to participate more actively in lumber merchandising than they have in the past. The two great branches of the industry should be more closely knit, both to manufacture and to sell with the greatest efficiency and the greatest service to the public. This does not necessarily require retail yards connected with mills, although that is desirable as a competitive factor in the trade and has, in some instances, furthered progressive improvements in retailing methods. The same end may be accomplished through closer cooperation between sawmill and lumber retailer in expert salesmanship, advertising, demonstration of lumber uses, and in the manufacture and marketing of special products. Manufacturers need to study lumber consumption from every angle and to bring the interest and point of view of the forest owner and lumber producer to bear upon merchandising.

The current publication of lumber prices appears to be one means of checking extreme fluctuations, which tend to make the trade speculative and unstable. These should be actual prices, not list rates or quotations. Publicity of this character would give the manufacturer more complete information about the retail market than is now available, and the consumer a better basis for purchasing intelligently. Similarly, lumber distributers would have more comprehensive and accurate information about manufacturing conditions and the wholesale market than they now obtain.

Authentic information on lumber prices is not generally available; hence clean-cut, open trading is often difficult. The publication of going prices would remove many current misapprehensions between different branches of the industry. It would aid in checking unreasonable prices or combinations on either side. On the other hand, it would tend to prevent the more destructive forms of competition. In other words, publicity would aid to stabilize prices in a rational, open, competitive way.

In large distributing centers, a lumber exchange with daily or weekly price reports would not appear inpracticable. Manufacturers' associations form a ready agency for assembling and publishing mill prices. Individual organizations might use the daily press or "house" journals. This is now being done to a limited extent.

As far as possible such developments should take place within the industry. The cooperation of public agencies should be available, however, if needed to obtain price data on a sufficient scale or to insure its accuracy.

A fourth need of the lumber industry is better use of its raw material, not only for lumber and the customary mill products like lath, heading, shingles, etc., but for many other commercial articles capable of being made from wood. The fundamental problem here is to obtain greater value from the tree. At least 25 per cent of the usable volume of the average tree is now left in the woods. But 47 per cent of the material in logs brought to the sawmill, on the average, is actually utilized as salable lumber. There is an estimated waste in woods and mills combined of 61,600,000 cords of wood annually. Furthermore, at least 30 per cent of the lumber manufactured is of low grade, seldom realizing a satisfactory return and often selling for little if any more than the cost of making it. Add the further significant facts that the cost of manufacturing small, low-quality logs is higher, grade for grade of the sawed product, than in the case of high-quality timber, and that the price of low-grade lumber is most liable to violent drops in periods of depression, and the primitive character of present forest utilization will be readily grasped.

The ultimate opportunities for better utilization of wood, particularly material of little value for lumber, are great. Chief among them are the manufacture of woodpulp, which is commanding a widening market for paper, fiber board, cellulose fabrics, etc., the production of wood alcohol and acetate of lime from hardwoods, and of ethyl or grain alcohol from practically all woods, the manufacture of producer gas, a cheap form of power, and the distillation of naval stores, tannins, and tar products. Market limitations will, of course, restrict such forms of using wood; but the development and marketing of such products rest primarily upon the energy which the forest industries put into it. Some 2 million cords of wood and mill waste are now used annually for these purposes. The bearing of this develepment upon the stumpage price of timber, through giving commercial value to a much larger part of it, hence upon the whole problem of carrying charges and realization, is obvious.

Successful development along these lines suggests the need for expert direction of the various parts of forest business, logging, manufacturing, seasoning and finishing, merchandising, and the exploitation of by-products. Each of these is a profession in itself.

All of the foregoing points to the large producing unit as better adapted to efficient production in the West and South where large quantities of stumpage are accessible within short distances. They are not suited to sections like New England, where the raw material is scattered. The problems of adequate capitalization are probably most easily handled by a comparatively large operation. The size of its output more readily permits the employment of experts in the many departments of a great forest industry. There will still be room for small mills, even in regions of large timber resources. Several logging operations and mills for rough sawing may indeed fit into a large organization concerned with the most highly developed manufacture, finishing, and merchandising of lumber.

A number of large organizations seeking the last word in the efficiency of each department would undoubtedly benefit the whole industry in extending its markets, exploiting its by-products, and developing standards of efficiency in all branches. And they would unquestionably benefit the public through improved service. Many of the advantages of trade associations or selling agencies can be accomplished more certainly and effectively by the large producing unit. It can *act* in accordance with business needs, whereas the association can only inform or advise. It can *adapt* logging and manufacture to the best merchandising while the agency can only recommend.

There appears to be no sound objection to such organizations. Their size in itself does not involve monopoly, and in an industry embracing so many thousands of plants spread over many competing regions the control of production or price through the growth of large operating units is remote. Possibilities of monopoly are, of course, inherent in such forms of industrial development, and should be guarded against. With adequate safeguards, however, the public should encourage what appears a necessary step in the lumber industry to cheapen its costs of production and increase its technical efficiency.

MANUFACTURERS' ASSOCIATIONS.

Improvement in business methods rests fundamentally with individual manufacturers or distributers working in their own interests, and with the banks and bonding houses which are in part responsible for the financial structure of the industry. Much can be accomplished also through trade associations, particularly in the fields of accounting, advertising, and market expansion. The value of the trade association lies in its ability to do special work of value to the whole industry in a region and to its consumers which the manufacturers or distributers can not afford to do individually. Lumbermen's associations have been discredited in the past through efforts in some instances to use them as a medium for fixing prices and other activities in restraint of trade. While practices of that character are to be condemned, and broken up by prosecution when necessary, it must not be overlooked that such trade associations have a legitimate field of cooperative effort. This includes the following functions:

(1) Advertising the lumber products of a region and educating consumers to their qualities and uses; demonstrating the value of such products for particular purposes and overcoming unwarranted

trade prejudices against them. The nature of lumber makes cooperative advertising desirable. There is little difference in the grades and species produced by the manufacturers in a region and little that is distinctive in the products of any one mill.

(2) Establishing and maintaining lumber grades, based upon study of the uses to which the wood is put; trade-marking and grade branding to maintain the quality of the product and fix responsibility for each shipment; furnishing responsible inspection service to buyers and aiding in the settlement of disputes; and eliminating sharp practices, grade manipulation, and fraudulent or irresponsible methods of selling lumber.

Modern lumber merchandising, often thousands of miles from the point of manufacture, would be impossible without strong organizations to meet these needs. The establishment of uniform grades is essential, under the modern diversity of lumber products, to intelligent buying. The architect, engineer, or contractor who wants particular kinds or qualities of lumber for particular purposes would be hopelessly at sea if he could not order in accordance with standard specifications followed alike by all manufacturers.

The establishment of uniform grades would, of course, be a necessary step in joint control of prices. This is a possibility of abuse inherent in a necessary development of the industry. On the other hand, uniformity in lumber grades promotes competition. There can be more clear-cut competition among manufacturers in bidding for trade and a better opportunity for buyers to obtain the lowest price on what they really want if the business is based upon standard specifications. The greater opportunity for direct shipments from sawmill to consumer is another aid to competition. A serious defect in lumber merchandising, in fact, has been that grades have not been sufficiently uniform or maintained with exactness through all stages of distribution; or adapted closely enough, in some instances, to the needs of the user, with reference especially to structural timbers where strength is the main requisite. Both "grade sweetening" to obtain business in periods of depression and "raising" the grade of poor lumber to the injury of its ultimate buyer are bad, often dishonest, practices, which only cooperative action can stamp out.

Of special importance to the public is a responsible inspection service and provision for the settlement of complaints. Orderly and satisfactory trade is impossible without these services. An association of manufacturers appears to be the best private agency to furnish them. The development of the lumber manufacturers' associations in the United States, with the recent inauguration of lumber trade-marks, is tending more and more toward the assumption of responsibility for the quality of the lumber shipped by its members. In this way, it is believed, will such organizations perform the greatest service to the industry and the public.

Among other legitimate activities of trade associations are:

(3) Maintaining credit bureaus and furnishing fire insurance at cost to their members.

(4) Investigating and handling freight rates and other traffic matters of common interest to the manufacturers in a region.

(5) Cooperation between lumber manufacturers and distributers in regard to the forms and methods of manufacture best suited to the trade, problems of distribution, the maintenance of grades and inspection service through all branches of the industry, the settlement of complaints, credits, etc.

(6) Conducting employment bureaus and studying labor conditions and efficiency in the various operations of lumbering.

(7) Conducting research, aimed to improve the mill products of the region or to extend their use, as through fireproofing or treatment to resist decay, and to facilitate and economize their distribution; or to overcome technical manufacturing problems like deterioration in seasoning; or to develop by-products such as the distillation of mill waste or its use for the manufacture of paper.

(8) Bringing about better and more uniform accounting among manufacturers and distributers, and disseminating data on the cost of production and distribution.

(9) Furnishing authentic, responsible information to the public regarding conditions in the lumber industry and its problems.

(10) Furnishing lumber manufacturers with the current trade statistics necessary to keep them informed on the condition of the market and to adapt their own business to its changing requirements. These include data on the volume of orders, shipments, and lumber stocks on hand, the prices which are being paid for various grades, special demands for certain grades or products, the price and supply of competing materials; in a word, the information needed to keep the lumber manufacturer in touch with the market which he supplies. This activity of associations does not involve manufacturers' agreements to curtail output or fix prices. Such restraints of competition would be facilitated by the statistical work of associations, but they are totally different things. The function of the association is to give each operator individually the facts which he needs to conduct his business intelligently in relation to the changing conditions of his market. This function is doubly necessary when the market is at a great distance from the mills.

There is a clear-cut line between these services to individual operators through an open-price association and activities in restraint of trade. With adequate safeguards the public should encourage such forms of cooperation among manufacturers as a necessary means of making the lumber industry more efficient. The activities of trade associations should be safeguarded (1) by the cooperation and control of a responsible public agency like the Federal Trade Commission, and (2) by systematic publicity.

The protection of timberlands from fire has been another phase of association work in the forest-owning branch of the industry. Its necessity and value are obvious. The development of logged-off lands and reforestation of areas not suited to agriculture, and the application of forestry in the management of timberlands generally might well be taken up likewise as cooperative activities.

LUMBER MARKETING—THE SELLING AGENCY.

Another step advocated by many lumbermen and already taken in some instances is cooperative marketing through selling agencies.

This is an application of the large unit to the merchandising end of the business, by marketing the output of several mills through one selling organization. The selling agency may buy the cut of its mills outright, resell the lumber, and distribute its earnings among the member mills or stockholders; or it may sell lumber for its members, or indeed for any mills in the region, on commission. These functions have usually been combined with the use of earnings for advertising and developing new trade.

Consistent with its individualistic character, the lumber industry in the United States has been slow to develop an effective type of selling agency. Many enterprises of this character have been unsuccessful. In practically every case it has been impossible for the selling agency to control the entire output of its members, the mills insisting upon the right to sell lumber independently if they chose. Often indeed, in periods of stress, mills have sold in competition with their agency. No agency has been successful in handling a very large volume of lumber. One of the most successful agencies has restricted its field to selling the upper grades of California pine in eastern and foreign markets and exploiting them as specialty woods of high quality. Another successful California agency has devoted its efforts entirely to the marketing of box lumber. An agency in Louisiana has been effective in building up and maintaining a stable market for cypress products.

Experience in the Northwest particularly seems to indicate the necessity for the selling agency to keep close to its mills in order to utilize the quality of their timber advantageously and adjust merchandising to necessary manufacturing conditions. Further, the mills themselves, to utilize the services of the agency fully, must adapt their products to the business developed by it. This may extend to the location of logging, the sizes of timber cut, etc. The necessity for close touch between the selling organization and its mills, back and forth, thus tends to limit successful agencies to those of comparatively small size. One of the most effective agencies on the West Coast has handled the output of a group of small mills producing chiefly timbers and specialties.

The principal advantages claimed for selling agencies are:

(1) A reduction in the cost of selling lumber by handling larger quantities and avoiding the duplication of selling expenses among individual mills.

(2) The distribution of large orders among several mills, securing the benefits of prompt delivery.

(3) The better opportunity afforded by the wider market available to the agency to dispose of the various lumber grades in accordance with their most profitable use.

(4) The employment of higher grade experts in merchandising lumber.

(5) A reduction in the average yard stock which it is necessary for the individual mill to carry, since the stocks of all the member mills are pooled for selling purposes.

(6) A reduction in average freight charges by routing lumber shipments as far as practicable from the mills nearest to the point of delivery.

The selling agency aims to secure the best markets for the products of its mills commensurate with their utility; in other words, to make its mills as effective a competing unit in the markets of the world as possible. It oftens introduces new competitive factors into old markets, to the benefit of consumers. It aids direct trade between the manufacturer and consumer or retailer. It seeks to stabilize the producing industry and its prices, not necessarily to increase the prices paid by consumers.

The value of the selling agency must be considered in relation to large lumber-producing regions whose market is mainly a distant one. Its advantages have special weight in the case of small mills whose own facilities for marketing lumber are limited, which are handicapped in keeping informed on trade conditions, and which are enabled, through the services of an agency with expert ability in merchandising, to share favorable markets with the larger plants to a greater degree than if each little mill shifted for itself. Such agencies are not unlike the well-known organizations of fruit growers, which market the output of a region cooperatively. The same economic function is often rendered by a wholesale broker or distributer, who may buy the entire cut of several mills. The merit claimed for the selling agency is that its marketing service is rendered in the interests of the manufacturer rather than the distributer, and with more expert knowledge of manufacturing conditions.

The difficulties in the successful operation of selling agencies are the disorganizing elements in the lumber industry, its individualistic character, the unwillingness of many operators to surrender control of their own sales or price policy, the pressure upon lumber sales from timber and plant investments, current obligations to borrowed capital, etc. In periods of depression, the selling agencies, broadly speaking, have been unable to hold back the unloading of lumber, either through pressure brought to bear upon the agency itself or indeed through extensive selling by its own mills outside of the agency. An added factor of importance is the exceptional capacity required in their management, particularly in holding the confidence of contributing mills. Questions as to the legality of selling agencies under the antitrust laws, furthermore, have undoubtedly held them back.[1]

The lumber-selling agency appears to be a sound application of cooperative marketing. Reasonably applied, it should aid efficient merchandising without impairing the essentially competitive character of the business. Aside from the restraints imposed by the antitrust laws, the competitive forces in the industry itself and the market pressure of substitute materials furnish safeguards against abuses of this form of organization. However, the possibility that a general organization of the lumber industry into large selling agencies might create conditions favorable to unwarranted price control should be guarded against by the supervision of a public body like the Federal Trade Commission and by thoroughgoing publicity on all of their activities.

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[1] In the suggestions contained in this report no attempt has been made to determine the legal status of such organizations or the need of further legislation to authorize them.

FOREIGN LUMBER TRADE.[1]

The United States now exports about 3 billion feet of lumber annually, chiefly softwoods from the regions having the largest supply and where the tendencies toward overcutting are most marked. The development of foreign trade would aid somewhat in solving the industry's problem of overproduction. It seems reasonable that the forest resources of the country should have a part in building up its foreign commerce.

Lumber exports might expand to a point which would threaten the interests of American consumers through an excessive drain upon our forests, particularly in regions of limited supply. Reforestation through public and private agencies should be an essential feature of a national policy favorable to the exportation of forest products. The interests of both the lumber industry and the country would be benefited far more by a policy which would build up commerce and forest production at the same time than by an arbitrary embargo upon exports of forest products. This is well illustrated by the history of Sweden and Norway, where the growth of foreign trade in lumber and pulp within the last 50 years has gone hand in hand with the development of public and private forestry.

The first need in relation to foreign markets is to put this trade on its feet. The exportation of American lumber to many countries has been handicapped by factors largely within the control of the industry itself. There has been too great a tendency to dump surplus stocks upon foreign markets rather than intelligently meet their own requirements. The grades, dimensions, and patterns called for by local customs, the conditions under which lumber is used, and the competition which it must meet have seldom been studied systematically. Such matters as the need for thorough seasoning to prevent deterioration of lumber in tropical climates have often been lost sight of. Investigations conducted by the Bureau of Foreign and Domestic Commerce disclosed instances at many ports where lumber shipments did not conform in grade and dimensions to the orders; and in many of these cases there was no responsible inspection service through which complaints might be adjusted.

Many factors involved in successful foreign trade call for cooperative lumber-selling organizations. Of particular importance is the need for maintaining branch selling houses or agencies in foreign countries, to avoid dependence upon local dealers or importers who have no interest in developing a market for American products. Other factors which require cooperative selling are the necessity for shipping lumber in large quantities and loading the large, modern ocean carriers with the least delay, and the need for a strong organization to deal effectively with the whole problem of shipping and charters. An organization of this character is best fitted also to furnish responsible inspection service and maintain standards of quality.

ADJUSTMENT OF THE LUMBER CUT TO CHANGES IN DEMAND.

Joint control of the lumber cut by manufacturers would threaten the competitive character of the industry but offers little promise of overcoming its

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[1] This subject will be covered fully in the bulletin by Dr. E. E. Pratt, Chief of the Bureau of Foreign and Domestic Commerce, on "The Exportation of American Lumber."

weakness. Such restraints on trade can not be considered unless a change in the national policy of dealing with its resources shall call for them as part of a broad plan of control and renewal in which the public shares and its interests are fully protected.

It is hard to adjust the lumber cut to a rising and falling demand, hard particularly to restrain the surplus saws from cutting more lumber than is needed. Extending the market for lumber at best can only bridge part of the gap. To be efficient the industry must be able to curtail when demand is slack; but this should be brought about by greater stability in timber ownership and by making the manufacturers individually strong enough to reduce their output when the market calls for it.

CHANGING DEMANDS OF THE LUMBER MARKET.

One of the serious business problems of lumbermen is the periodic but irregular expansion and contraction of their market. The demand for lumber is constantly rising and falling. General prosperity is usually reflected in periods of special activity in the building trades with a sudden demand for a large volume of lumber, usually followed by months or years of slack orders. The demands of the railroads, which rank high among consumers of lumber for car construction, ties, and other purposes, are exceedingly variable, taking perhaps 15 per cent of the cut one year and but 5 per cent the next year. Large or small crops are always reflected in an increased or reduced demand for lumber in agricultural districts. And there is a marked seasonal fluctuation in the requirements of farming regions, with usually heavier orders every fall after crops are harvested.

Aside from seasonal trade which can be anticipated, the changing demands of the lumber market necessitate expansion and curtailment of production. The industry now adapts its ouput to these changes in consumption but slowly and ineffectively. The presence of large stocks of lumber in the face of a decreasing demand, leading to indiscriminate price cutting, has frequently brought returns down to less than the cost of production at many mills.

Expansion and contraction in the output of small mills to meet changes in markets near them, as in central New England, is comparatively simple. As in many other problems of the industry, the full weight of this difficulty is felt where a large volume of lumber production is concentrated in States like Texas or Washington whose plants are at a long distance from their principal markets and are necessarily organized for steady operation.

Many of the stronger and better-financed operators who are not under such pressure to manufacture lumber that they must do so at a relative sacrifice curtailed heavily or closed down altogether during 1914 and 1915. The sustained cut of many other mills, however, forced by weak capitalization, heavy indebtedness, or the pressure of timber holdings, partly counterbalanced this curtailment and kept the market almost constantly overstocked during those years.

The discordant nature of the lumber industry stands out strikingly in this connection. While some mills curtail, others run double shifts, seeking to weather the upset market by reduced overhead charges on a larger output; and still other mills are built and begin cutting because of the need of realizing upon investments in timber. Rational and seasonable curtailment will be extremely difficult as long as these industrial weaknesses continue. Particularly will it be difficult, under any scheme or organization which might be devised, to hold back the pressure of stumpage investments.

The relation of the small mill to the general problem of adjusting output to demand is important. Representing comparatively small investments and low overhead costs, with their owners often indeed having other occupations, such plants are much better able to suspend cutting when the market is off than their larger competitors. Small mills, at least in many sections, would thus seem to have a valuable economic function in supplementing the cut of large, continuously operating plants, when the variable demands of the country require it.

The greatest difficulty in a rational adjustment of the cut of lumber to current demands is the pressure of stumpage investments for liquidation. No adjustment will be effective until the productive industry is severed from timber speculation; that is, until more stable forest ownership comes about. Other developments, in the field of manufacture, should aid. Among them are:

(1) Sounder accounting and more exact knowledge of costs of manufacture.

(2) Better financing of manufacturing plants and particularly more working capital. This, by and large, would make the mills less dependent upon a continuous movement of lumber. It should aid in eliminating forced sales. Particularly it should permit holding stocks during periods of slack demand instead of dumping them upon the market for whatever they may bring. The months which usually elapse between cutting the tree and finishing and seasoning its boards often make it impossible to meet a reduced demand by curtailing logging operations. The adjustment must come in part through carrying greater or smaller reserve stocks of manufactured lumber. All of these advantages of strong financing are well exemplified by many of the better-organized companies.

(3) More accurate and more frequent information on trade conditions. Ignorance of current demands and prices and of conditions among consumers which foreshadow coming requirements has been responsible for much overproduction.

RESTRAINT OF TRADE BY JOINT CONTROL OF PRODUCTION.

Improvements of the character just described would aid lumber manufacturers as a whole to adapt their output more effectively to the volume of demand and avoid serious overproduction. The cut of lumber would still be curtailed, however, when necessary by the operators individually, each following the policy dictated by his own costs, available markets, and other business circumstances. Artificial restraints, like curtailment by joint agreement, are quite certain to be ineffective on account of the individualistic character of many lumbermen, the diverse conditions governing their business, and particularly the ever-present necessity to meet obligations and liquidate investments in timber. Except as the surplus stumpage can be effectively held back and the individual manufacturing plant can acquire the strength which permits it to curtail or suspend operation when desirable, paper agreements to limit output are of little avail.

They would be like trying to stop the floods of the Mississippi by a flimsy dam on its lower channel instead of improving each tributary watershed.

Joint control of output would involve danger to the public from restraint of competition. The present industrial conception of it is not in harmony with American economic policies, and many lumber manufacturers do not believe in it. The principle of regulating production can be applied only as part of a broad national policy for utilizing and developing the basic resources of the country. And its application must be under some form of control in which the public shall share directly and decisively.

Any means of regulating production will be justified only if it seeks to stabilize the market in both directions; that is, to protect the public against underproduction and unreasonable prices as well as to prevent overproduction and abnormally low prices. And in the case of timber-using industries, an essential part of this development should be the conservation and renewal of raw material, by the industry, through the practice of forestry.

STABILITY IN TIMBER OWNERSHIP.

There is over 700 billion feet of private timber in the West beyond what can be carried by its mills. A safe means of holding this vast surplus, like surplus currency in a bank, until manufacturers need it is necessary. As far as this can be done by private ownership, it must be nonspeculative and free from pressure for early or high returns. The small holding which meets these needs in parts of the East will move westward but slowly. Large holdings may or may not perform this timber banking service effectively, but give promise of leading the way to greater stability.

Public cooperation in fire protection and moderate taxation will be an important factor. In self-interest, however, the public should participate directly by extending State and National Forests. Thereby it will intrench itself in the strongest position to check wasteful use of timber and keep the lumber trade competitive should occasion arise.

THE RESERVOIR OF TIMBER IN THE WEST.

Five of the Western States contain 888 billion feet of privately owned timber. This region is the great national reservoir of stumpage. Its disposal is a matter of concern to the public and at the same time the largest problem of the lumber industry.

The sawmills in these five States are cutting something under 9 billion feet a year. Twenty years' supply of stumpage may be taken as the most that the productive industry can carry. This is equivalent to 180 billion feet, less than a fourth of the total in private ownership. The remaining 708 billion feet is a surplus, or reserve. In the interests of the public and the industry alike, this should not be forced upon the lumber market in advance of a real demand. The rate at which the cut of western timber will increase does not affect these basic conceptions. Whenever there is a larger demand for lumber the surplus will be drawn upon for the supply of additional sawmills. The point is that a large reserve in some form of strong ownership is essential.

It is worth while to point out the difference between carrying stumpage behind a sawmill and carrying timber for whose manufacture there is no immediate prospect. In the first instance, the investment is steadily reduced from year to year. The returns from lumber sales presumably will pay taxes and other carrying charges on the amount of stumpage necessary for the most efficient operation of a given plant. The timber may be charged to manufacture at its first cost and a part of the proceeds set aside to carry the remaining investment. These charges will diminish from year to year, throwing the heaviest burden upon the first part of the operation. Or taxes and interest may be capitalized in the form of an increasing book value of stumpage, throwing the heaviest burden upon the latter portion of the operation.

Where timber is not part of the supply of a manufacturing plant, however, or exceeds its logical requirements, there is no sound way to account for current charges upon it save by adding them to the capital invested in the property. The former basis of capitalization seems to have been too high. But at any interest rates employed, or eliminating interest and considering only outlays for taxes and protection, the future capitalization of carrying charges is the only means of booking the cost of timberlands held over long periods, except, of course, as current revenue may be obtained from such sources as grazing livestock.

The biggest forest problem of the West is to carry its surplus timber on a moderate basis of original and current capitalization, and to sever this business from the manufacture of lumber. The latter should stand on its own feet, as a productive industry gauged to the measure of its market and carrying only such quantities of raw material as will make it most efficient. It should not be made to serve the exigencies of timber speculation.

THE KIND OF FOREST OWNERSHIP NEEDED.

Stability over long periods is, by their very nature, an essential of forestry and forest enterprises. Intrinsically, the ownership of timberland is not a field for speculation, but for safe, long-term investments, more comparable to the 2.5 per cent Government bond than the 6 per cent industrial loan. This is especially marked where forestry is practiced—that is, where the land is held and managed with a view to successive crops of wood. Forestry is out of the question if land ownership is shifting or speculative or if it seeks high profits or is dependent upon immediate income.

Applied to western conditions, this calls for a form of timber ownership not dependent upon the prevailing commercial rates of interest and as free as possible from pressure for returns at stated times or in stated amounts. Timber investments must seek a lower rating which can be sustained permanently by their long-term character, their low risk if fire protection is adequate, and the moderate earnings which can be anticipated. Forest ownership should stand toward the manufacturer as a bank, controlling the surplus forest capital, and protected in its form and financial basis from the influence of ups and downs in the lumber trade.

This ideal, it will be understood, is a stable *type of forest ownership*, wholly independent of the size of timber properties. It may indeed be realized either through large or small holdings. The protection of timberland from fire, the first step in forestry, should be an integral feature of it, together with the keeping of lands best suited to tree growth in permanent forest production.

A large amount of timber in the thickly settled Eastern States is carried under a stable form of private ownership in small, diversified holdings. About 190 billion feet, or 7 per cent of the total supply of the country, is attached to farms as woodlots. Other areas aggregating millions of acres are carried as small forest properties in regions where well-developed markets permit partial realization upon investments from time to time and give security to their future value. Such properties are subject usually to but moderate taxation, are conservatively capitalized, and often indeed are not subjected to rigid tests of cost and profit.

This form of ownership will doubtless become in time a valuable factor in the West as it is now in the East. But it will come about slowly. The amount of virgin timber is too great in proportion to the population, the general economic development, and the limited market for forest products to afford as yet a large field for the small holding which is stable.

LARGE PRIVATE HOLDINGS—THEIR GOOD AND BAD POSSIBILITIES.

Large timber holdings in the Northwest have two aspects. They may render a real economic service to the public and the industry—that of carrying and protecting part of the necessary timber reserve until the country needs it, and contributing meanwhile to local public revenues. To the extent that they have been stable, such holdings have rendered this service. It is of special value in the case of properties managed by men familiar with timber and industrial conditions who aid to stabilize the industry, and whose attitude toward local and community interests is liberal.

On the other hand, the power gained by the control of very large bodies of timber may be used readily in injurious ways. This is evident not only in the local ill effects of a narrow and selfish administration, but also in the influence of speculative and overcapitalized enterprises conducted on an extended scale. Large owners, furthermore, bent upon immediate returns, have in some instances constructed mills and thrown quantities of lumber upon the market regardless of the existing overproduction. When a large holding ceases to be stable, its very size and weight make its injurious effects proportionately great.

There is the further possibility of extending large holdings to the point of a timber monopoly, as pointed out by the Bureau of Corporations in 1910.[1] This danger is not immediate, but can not be ignored. Pooling schemes extensive enough to suggest it, through bringing in large amounts of outside capital, have not been lacking, specifically in the case of California redwood and West Coast fir. The present tendency, even among large owners, is not toward monopoly but competition. Many of them are selling stumpage as opportunity is afforded to loggers or manufacturers. Many of them are themselves competing as manufacturers in the lumber market. The danger of a reversal of this competitive tendency lies chiefly in a prolonged period of demoralized stumpage values, which might encourage wholesale purchases at depreciated prices.

The large timber holdings thus may or may not meet the requirements of stable forest ownership. A number of them are valuable factors in carrying the timber of the Northwest, and seem, indeed, to be leading the way toward the type of ownership which is needed. Other large properties have accentuated the tendencies toward speculation and overproduction. Furthermore, the single economic service of carrying reserve stocks of timber may be more than offset by the social and economic ill effects of the land barony. Among these is the tendency to subordinate the varied resources of large areas to one use, to restrict diversified development, and to hold back growth in population and in independent homes and enterprises.

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[1] Report on Investigation of the Lumber Industry, Part I, Standing Timber.

HOW BETTER FOREST OWNERSHIP MAY BE BROUGHT ABOUT.

There are two ways of carrying the surplus timber:

A more stable type of private forest ownership may grow out of the present conditions. This will result from a greater or less loss on individual investments, from the partial liquidation of some of the more highly capitalized properties, and from the elimination of the speculative element in timber buying.

A second solution is the enlargement of the public forest holdings. Public ownership, as exemplified by the administration of the National Forests and of the timberlands of some of the States, can meet the requirements of stability more readily than ordinary private ownership. The National Forests carry 623 billion feet of stumpage.[1] Their timber can be purchased only for immediate use. Speculation is taken out of the business. The operator is a manufacturer pure and simple, and aside from his manufacturing investment, is under no pressure to cut when the market is out of joint. Under the methods of cutting prescribed raw material is worked up with less waste than that common on private lands, and the regrowth of the forest is assured.

This kind of public ownership extended to more of the surplus stumpage in the West would aid powerfully in solving its forest problems. At the same time it would meet other economic needs, particularly the conservation of water, the reduction of flood damage, and the protection of navigable rivers. Extensive forest activities are now proposed solely on this account, and it is more than likely that sooner or later the public will have to acquire and protect many forested watersheds. Here, then, is an opportunity to solve two great economic problems at once.

A fundamental requirement of public ownership is to provide an adequate return to States and counties for the income lost through the withdrawal of property from their tax rolls. This obligation must be recognized by assuming the construction and maintenance of a just share of community improvements or by provision for community revenue from the use of public lands. Both means are used in the case of the National Forests.

Stable forest ownership might be secured by administering public and private lands as a single holding, publicly controlled as to rate and methods of cutting. Most of the advantages of outright public ownership could thus be assured. The ultimate solution of the whole problem must come through the general practice of forestry, cutting in each region no more than the current growth of its woodlands. Public regulation of private forest lands will have a necessary and important part in this development. But in the face of many economic, business, and legal obstacles the process must be one of gradual adjustment.

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[1] Estimated lumber cut, not log scale.

Three things will be of help in bringing about the kind of private ownership fitted to carry timberlands in the West: (1) Lower interest rates on timber investments, (2) moderate and dependable timber taxes, and (3) general fire protection.

Aside from general changes in the money market, the availability of capital for timber investments at low rates of interest depends upon the standing which they acquire as safe, long-term securities. This can only come about gradually through greater stability in lumber markets, through more general and permanently established fire protection, through lighter tax burdens on timber, or at least assurance that taxes will remain moderate, and through the leadership of moneyed men who are willing to stake their funds on the security of timber properties carried over long periods and thus break ground for this form of forest financing.

The important bearing of timberland taxes upon stumpage investments has been indicated elsewhere. It is not so much a question as to the inequity of present tax burdens, although undoubtedly the burden is excessive in some western counties. It is rather the menace of increasing taxes in many sections, and the further problem of adapting a property tax, levied year after year or decade after decade, to a form of wealth which produces no current income. A yearly tax of 1 per cent of the current value may not be excessive on property yielding a fair annual return; but if carried for 25 years of no returns it becomes a serious burden. Unless very moderate in amount, taxes on such property will either force the speedy cutting of the timber or lead sooner or later to its confiscation by the State. The concentration of logging in counties where tax rates are exceptionally high, and the common policy of lumbermen to cut their most heavily taxed timber first, bear testimony to the effect of immoderate taxation. Particularly do they indicate the danger that State and county may, by taxation beyond the capacity of the industry to bear, hasten the cutting of timber abnormally and lead to wasteful utilization. Unwise taxation may thus react upon local communities by forcing the uneconomic destruction of taxable property. Some of the older lumbering regions furnish striking examples of the community loss resulting from the wiping out of their principal taxable resource.

Uncertainty as to timberland taxes forms to-day one of the most serious problems of the forest owner. In the Northwest they constitute a fixed, cash carrying charge of from 0.5 to 1 per cent. Interest on investments may be deferred or, indeed, foregone altogether. But taxes, a yearly cash outlay, add a steadily accumulating sum to the cost of the property. Insecurity as to their future course makes it impossible to forecast this burden in definite terms as a feature of long-term forest investments.

It is not the province of a brief investigation to indicate a solution of this complicated problem. It involves the immediate needs of States and counties for revenue and for community development. It involves the equities of other classes of property owners. This is a problem for solution by the Western States themselves, in consideration of all of these equities and interests. The purpose of this report is rather to point out that moderate, and particularly stable, taxes will aid powerfully in securing the right kind of forest ownership.

Public and private fire protection is now well developed and correlated in most of the forest regions of the West. The need is not so much for greater activity or increased expenditures, except in some regions, as for establishing the work already done on a lasting basis beyond reach of sudden change or political upsetting.

EXTENSION OF PUBLIC OWNERSHIP.

Viewing the whole situation, there can be no question of the desirability of enlarging the public forest holdings. The burden of carrying a surplus of 708 billion feet is too heavy for the industry alone. The waste of this resource will be too great and its ultimate effects upon the public interests too serious to permit leaving the correction of present bad conditions wholly to slowly developing changes within the industry.

Large public forests, furthermore, will work both ways. When the industry is dissipating its resources through overproduction, as in 1914 and 1915, a conservative policy in the administration of public holdings will aid to maintain more normal and less wasteful conditions. But if tendencies toward monopoly develop, perhaps as the result of depreciated values, possibly as the outgrowth of large private holdings, extensive public forests can be equally effective in keeping the industry competitive. Ownership of a considerable part of the timber surplus would keep the hand of the public on the throttle. It is by far the most effective check which could be devised against any dangers to the public interests which may grow out of the abnormal conditions in the lumber industry.

The public now controls about 679 billion feet of timber—545 billion feet in the National Forests,[1] 14 billion on unreserved public lands, approximately 50 billion in national parks and Indian and military reservations, and some 70 billion feet in the holdings of various States. The public owns something over one-fifth of the timber in the States, and one-fourth of the total including Alaska.

Obviously the cardinal point in our public forest policy should be to retain the timber which the people now own until required for manufacture. The demand for public timberlands at the terms fixed by the homestead and timber and stone acts is ever insistent. It is raised repeatedly in the name of local development, of local revenue, of self-government as contrasted with long-range, bureaucratic administration. But it is at bottom a demand for speculative gains rather than for real use or economic development. Wholesale yielding to this demand during the 40 years prior to the creation of the National Forests is the primary cause of the present serious conditions in the lumber industry. The industrial conditions which have come to a head within the last five years have not only shown the necessity of the National Forest policy but the urgency of retaining every acre of public timberland which is not best suited to agriculture or other special forms of use.

Unreserved public timberlands not suited for agriculture should be placed in National Forests. The principle of reserving in public ownership all timber not required for present manufacture should govern the disposition of any lands which the Federal Government may acquire through cession or forfeiture. There is an immediate demand for this policy in the disposition of the Oregon & California Railroad grant in Oregon, whose 50 billion feet of stumpage, if placed in the way of speculation, will seriously accentuate the bad conditions in the overloaded manufacturing industry of the West Coast. How much better for the public to hold this timber and sell it to unhandicapped manufacturers as the lumber market affords a place for it.

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[1] Including the National Forests in Alaska, the total estimate is 623 billion feet.

The same principle applies to the States. The policy of disposing of timber only as required for manufacture and retaining the land for reforestation, except as it may be more valuable for agriculture, should govern the 10 million acres of forest now in State ownership and other timberlands which the States may acquire.

The second step should be to extend the public forests. This is probably most desirable in the less accessible timber of the Northwest, the portion of the surplus which could be acquired most cheaply and which, in the nature of things, must be carried the longest time before there is need for its manufacture. Much of it is in the vicinity of the National Forests and could be cheaply protected and administered as additions to them. There are, for example, some 10 billion feet of privately owned timber on the headwaters of the Columbia in Idaho and Montana which can not be reached within the present range of logging costs in that region. The more accessible and high-priced timber in the pine belt of California is sufficient to supply its manufacturing industry, including any increased output that can be reasonably anticipated, for easily 30 or 40 years; and there is left 48 billion feet of less accessible privately owned timber in the higher mountains which by location is a reserve for the future. Many other billions are similarly located back in the Cascades of Oregon and Washington. The recovery of such timberlands by the Government would strike directly at the principal forest problem of the West. But no such policy should provide a means for cashing in on speculative ventures.

The lesson driven home most strikingly by the troubles of the lumber industry is that carrying timber whose utilization lies far in the future should be a public rather than private function. The effective remedy is to make good the mistakes of the early public land disposal and take part of the timberland back. To avoid unjust local burdens, however, an equitable compensation to communities for the withdrawal of taxable property should be an integral part of such a policy.

It is desirable that the States no less than the Federal Government take this forward step in conservation. Both are now in the field as forest owners. There need be no difficulties over jurisdiction. In several Western States the State and Federal governments are exchanging forest lands in order to block their holdings for ease in administration. Additions to the ownership of each would group themselves under the same principle.

FORESTRY AND FARMING ON LOGGED OFF LANDS.

Cut-over forests have renewed themselves largely by accident and the force of nature. Vast logged-off areas are barren of regrowth. Largely from unavoidable economic causes, lumbering and private land ownership have used up forest resources section by section without restoring them. Parts of

the United States are suffering from timber shortage and depleted industries in consequence.

Fresh virgin forests farther on will not be available always. Each region will become more and more dependent, for lumber at reasonable prices, upon its own resources.

Staggering areas of cut-over lands have accumulated in many sections, and millions of acres are added to them annually. The difficult problems involved in the rational use of this residue can hardly be solved without public aid, to put the farmer on what is tillable and restore the forest on what is not.

Greater economy in the use of wood will become necessary at best when the virgin forests of the United States are exhausted. Severe shortages are certain unless the productive capacity of cut-over forest lands is put to work. Private ownership can do but a part. Public ownership must do the rest, aided by regulation of the handling of private forest lands.

FOREST RENEWAL ON PRIVATE LANDS.

Considerable areas of woodland in the United States have produced timber more or less continuously under private ownership. This is true of probably 30 or 40 per cent of the 191 million acres of farm woodlots. It has been true of the greater part of New England and portions of other Northeastern States by reason of conservative ownership, moderate taxation, local markets for many forest products, and vigorous natural growth.

Elsewhere forests have been restored on land abandoned by the farmer. The restocking of abandoned farms and pastures in New England and of old fields in Virginia and the Carolinas, whose cultivation was stopped by the Civil War, has taken place on such an extended scale as to materially increase the production of wood in those regions. It seems probable that at least 10 per cent of the present cut of yellow pine is from second growth, an important factor in keeping up the lumber production of the South. In other forest regions new growth is taking place on old cuttings or burns, here and there where fires have been kept out, but as yet on a small part of the denuded lands. Its increase is being aided powerfully by the extension of public and private fire protection.

The force of nature is the principal factor everywhere in this renewal of forest resources. The other large factor has been control of fire. Large areas in the Northeast have restocked without man's aid, from natural reseeding under climatic conditions adverse to forest fires. Less favorable fire conditions in the Lake States have kept vast stretches of cut-over land in barrenness.

RESULTS OF DESTRUCTIVE LUMBERING.

Broadly speaking, however, lumbering in the United States under private land ownership has consisted in using up timber, not producing it. Lumbering has steadily diminished the supply of stumpage. The forest-using industries for the most part have been shifting industries, exhausting the timber supplies in one region and moving on to fresh supplies wherever they could be found.

Serious economic and social effects have resulted from this transient character of forest-using industries. They are shown particularly in parts of Pennsylvania, parts of the Lake States, and parts of the South. Sections once prosperous from the sawmills and logging camps which they supported now have little but piles of sawdust and burned stump lands. The businesses and sources of employment built up around lumbering collapse. Much of the population leaves and the character of what remains is changed. With the passing of the sawmills, many sections have lost one of the most sturdy and virile elements of their people.

Thus far the local effect of timber shortage, due to failure to renew the forest resources of a region as they are consumed, have been the most serious. Timber famine has become a reality in many of these old lumber-producing regions, not in the sense that lumber is not to be had but that one of the sources of industrial life is gone, and further, that the cost of forest products has increased because they must now be obtained from a greater distance.

It must be recognized that the manufacture of lumber has doubtless developed more rapidly and efficiently as the result of concentrating the large sawmills in one or two regions at the same time, and that the cost of production has been reduced by this means and by the repeated moves—north, south, and west—to fresh bodies of cheap stumpage. Furthermore, the local cost of lumber in any region would tend to increase as its virgin stumpage becomes exhausted and is replaced by second growth. These factors somewhat offset the increased cost of lumber due to freight charges from distant sources of supply. There can be no question, however, as to the net increase in lumber cost to most regions resulting from using up their own supplies of timber without restoring them, aside from the general economic and social losses arising from the extinction of a large industry. Regional timber exhaustion has already powerfully affected the cost of lumber to consumers.

The total consumption of wood in the United States is estimated at aproximately 101 billion board feet annually. Fifty-two billion feet cover the main commercial products—lumber, railroad ties, mine timber, poles, pulpwood, veneers, etc., as reported by the census of 1912—leaving 49 billion feet for fuel and fencing.[1] It seems probable that this amount is considerably more than the volume of wood grown annually in the forests of the country. We are still subsisting mainly on reservoirs of virgin timber.

The decrease in per capita consumption of lumber will undoubtedly be accentuated by the greater transportation costs when the bulk of the output moves to the Northwest. This will be one way of meeting a general timber shortage. Another and far more desirable means should be the widespread reforestation of cut-over timberlands which are not adapted to more profitable forms of use. In any event, the readjustment of the country's demands to these changed conditions of supply will probably be accompanied by increases in the cost of lumber until a settled basis is reached.

The concentration of lumber production in a few regions is abnormal. It arises in part from the cheaper production possible at large plants in sections having vast quantities of high-grade and cheaply logged stumpage. Lumber manufactured in the far Western States thus undersells the local timber of the central Rocky Mountains in its own market. The large virgin supplies of the latter are poorer in quality and more costly to log. The supply of timber in the present large producing regions, however, will gradually be depleted. As they develop in population and in agriculture and manufactures, more and more of their timber will be consumed at home. In other words, the ultimate tendency of forest industries is to become localized, each region furnishing the bulk of the ordinary forms of lumber required and importing only the more specialized grades or products.

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[1] The last figure is an estimate made by the Forest Service.

Developments of this character will necessarily vary in accordance with the demand for land for other purposes and the availability of land capable of growing timber. The Great Plains and Central Western States, with their intensive agriculture, must always be supplied from the outside. Regions having little agricultural land, like the Northwestern Rockies or the Cascades, will always be exporters of lumber; but increasing local population and a decreasing supply of timber will tend to restrict the areas which they serve.

The significance of the "timber famine" thus lies in the adequacy of the forest resources in each region, and hence in the prices which the consumers of the region must pay. It will become more and more costly for any region to be more dependent upon outside supplies of wood than the value of its land for other uses may necessitate. This applies particularly to the Eastern and Southern States, whose distance from the forests of the West can be bridged only by high transportation charges.

THE PROBLEM OF ACCUMULATING CUT-OVER LANDS.

The cut-over pine lands in the Southern States have been estimated roughly at 64,000,000 acres. They are increasing at the rate of some 2,000,000 acres a year. Estimates furnished by the owners of large areas class 75 per cent of them as agricultural, although their use for farming purposes will come about slowly and many tracts could doubtless produce a merchantable stand of second growth before they will be taken for tillage.

Logging on the West Coast has probably cut off 4,000,000 acres of Douglas fir lands, and is adding about 150,000 acres yearly. While a considerable part of this land has fertile agricultural soil, its cultivation will progress very slowly on account of the great labor and cost of clearing it of stumps and logging débris. At least 2,500,000 acres of logged-off fir lands have not yet been put under the plow.

The cut-over lands in the sugar and yellow-pine belt of California, in private ownership, now total 1,084,000 acres. They are increasing at the rate of about 32,000 acres yearly. It is estimated that on account of their high elevation but 4 per cent of these lands have agricultural possibilities. The cut-over lands in the redwood region now amount to 416,000 acres, of which about 236,000 acres appear to have no value for agriculture or grazing. Much of the rest is of doubtful utility for any other purpose than growing timber. These cut-over areas are accumulating at the rate of 6,500 acres yearly.

In the Inland Empire approximately 3,000,000 acres of timberland have been logged, and the area is increasing at the rate of 100,000 acres a year. Perhaps 75 per cent of the private land thus far cut over, which is lower in elevation and contains more fertile soil than the National Forests, is potentially agricultural. This leaves, however, some 750,000 acres of land cut over to date which is most suitable for the production of timber.

Aside from these regions which were covered by the present study, the Lake States are estimated to contain 27,000,000 acres of cut-over lands which are partly restocking, the Northeastern States 38,000,000 acres, the Central States 54,000,000 acres, and the hardwood sections in the South 41,000,000 acres. Aside from these vast areas, there are probably 100,000,000 acres in various parts of the country which have been logged off and burned, or become barren, where but little forest growth is taking place.[1]

How to use these enormous and increasing areas of logged-off land is one of the large economic questions of the country. To many owners, particularly in the West, they are a problem, and a questionable source of profit. Stagnation is overtaking communities through the depletion of their timber, with no compensating development of its residual product—stump land. The potential agricultural values are often large, but their development under the high cost of clearing, inaccessibility from market, and lack of roads and other community facilities is exceedingly slow. Often it has been set back by speculative or ill-advised efforts at exploitation and by overcapitalizing stump-land values.

Difficulty in discriminating between agricultural lands and lands not suited to cultivation presents a further problem. Cut-over lands of little or no real value for tillage have been palmed off upon ignorant settlers by speculators in many sections of the country. On the other hand, timber values are still too low, ultimate returns too uncertain, and the tax burden too menacing to encourage private owners in holding and protecting cut-over lands for regrowth except in restricted parts of the country. The yearly property tax bears with special force upon lands held without income during the long time required to grow a new stand of timber. Unless so light as to be practically negligible, or unless markets for small material are exceptionally favorable, the property tax in itself may largely defeat private reforestation. Second-growth lands have thus been given special emphasis in proposals for a harvest or yield tax, payable when timber is cut.

The difficulties in the rational, well-ordered development of logged-off timberlands as a private enterprise have led to suggestions by lumbermen and others that these areas be acquired by the State or Nation, systematically classified as to quality, and put to their most productive use under public direction. Similar results, as to agricultural lands at least, might be accomplished by cooperation among landowners, if directed with the view to community interests which has been evidenced in some enterprises of this character.

It is only possible in this report to draw the outlines of this large question and indicate the need for public cooperation in its solution. It is desired particularly to point out the bearing of logged-off lands upon the future supply of timber.

GROWTH ON LOGGED-OFF LANDS.

The present areas of denuded land have large possibilities in the production of wood. It has been roughly estimated, for example, that the yellow-pine lands now cut over are capable of producing upward of 6.5 billion feet of timber annually. Including the areas of young trees on virgin lands, it seems probable that the present cut-over and restocking forests of the United States have a potential yearly growth if protected from fire of at least 35,000,000,000 board feet. This excludes the possible growth on some 100,000,000 acres of heavily burned and denuded land which is not restocking or is of low productive value. On the other hand, the productive areas in the South and elsewhere will be cut down to a greater or less degree by agriculture. And it is doubtful if over two-thirds of this possible growth will be in a form suitable for saw timber, the rest being usable for such products as fuel and pulpwood.

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[1] Report of the National Conservation Commission, 1908.

Any estimate of future forest production on nonagricultural lands in the United States, including the areas now timbered as well as those cut over, is apt to prove wide of the mark. It may be worth while, however, to indicate the general possibilities if some of our forest regions are given adequate protection. Easily half of the productive timberland in western Oregon and Washington, for example, or more than 17,000,000 acres, is not fit for agriculture. If this area could be kept continuously in forest growth as it is logged, 6,800,000,000 board feet a year could, at a very conservative estimate, be obtained from it—more than the present total cut of Douglas fir. The Inland Empire is estimated to contain nearly 6,000,000 acres of private timberland and 30,000,000 acres of State and Federal timberland which is not suitable for agriculture. These areas have a potential yield of probably 3.5 or 4 billion board feet. Similarly, the 22,500,000 acres of nonagricultural public and private timberland in California, cut and uncut, have a potential yield probably in excess of 3.5 billion board feet, more than twice the present output of its mills. And if not more than 60 per cent of the southern yellow-pine lands are put into farms, a continuous yield of at least 5 billion feet from that region should be possible.

Data are not available to extend these rough estimates to other parts of the United States. In general it seems probable, however, that with the increasing demands upon land for tillage only by very close management will the United States be able to meet its future lumber requirements from its own resources, even if the present total consumption of wood is somewhat reduced. This will necessitate restoring as large a part of the unproductive lands as possible to forest growth. Such yields as those indicated can be realized only through better care than is now afforded cut-over lands in the aggregate.

PUBLIC AID AND REGULATION IN THE RENEWAL OF FOREST RESOURCES.

The rapid using up of timber in many States much faster than it could be reproduced, and without provision for its renewal, was inevitable. Often, indeed, this was an economic necessity. The holding of lands for regrowth as a private business has been made impracticable very largely by physical and economic conditions. Timber of most of the staple species can not be produced in sizes required for commercial use in less than 60 to 120 years. Delayed returns, fire risk, carrying charges, and uncertain future stumpage values make the usual private owner unwilling, and indeed unable under present conditions, to renew the forests which he has destroyed. Private ownership has the best opportunities in regions like Central New England, where timber values are relatively high and stable, returns frequent, and current charges low. Under such conditions it meets fairly the needs of conservation.

On larger areas reforestation is accidental, as on the abandoned farm or the old cutting left to itself. On many of these second growth has attained merchantable size. On many others it has been destroyed through lack of protection from fire or because the owner, attaching no value to it, has disposed of the land for other purposes. As second growth replaces virgin stumpage and a shortage of timber tends to throw each region upon its own resources, the New England conditions will spread, carrying opportunities for forestry on private lands with them.

But future supplies of wood will not be assured adequately by private ownership. The United States is no exception to the countries of Europe, where public ownership of large forest areas has been found essential.

There should be a core of publicly owned forests large enough to lead the way economically and technically in supplying the country from the current growth of its woodlands, and to protect the public from unwarranted increases in lumber prices during the process of adjustment. Particularly should State and Federal effort be directed to the acquisition and reforestation of cut-over lands in regions like parts of the Alleghenies or the Lake States and the mountainous sections of the West, where conditions are too hard for the private owner.

Cut-over lands can often be obtained at very low prices; many tracts, indeed, will revert to the States for nonpayment of taxes. Large tracts of logged-off lands lie within the National Forests of the West, and many other areas adjoin their boundaries. In the California Sierras, for example, there are 459,000 acres of cut-over land inside the National Forests, mixed with the present Government holdings, and 625,000 acres adjoining the Forests. The same situation exists to a greater or lesser degree in all of the National Forests. Many of these cut-over lands could be acquired through the exchange of timber on the National Forests for land at a low valuation, a policy which would go far in building up forest resources without the direct expenditure of public funds. Where cut-over lands are mingled with the National Forests or adjacent to them, the advantages of Federal acquisition for simplicity and economy in administration are obvious. Elsewhere this work should be taken up by the States. Particularly should the States adopt a uniform policy of classifying lands receded for nonpayment of taxes, and of holding and protecting areas found to be suitable only for tree growth.

Public ownership should be backed up by reasonable requirements imposed upon the handling of private forest lands. The starting point should be fire protection, the first essential of forestry, enforced through such measures as the disposal of slashings and an organization for detecting and extinguishing fires on both timbered and restocking lands. Several States have taken partial steps in these directions.

THE USE OF PUBLIC TIMBER.

Physical conditions make a large part of the National Forests a reserve for the future. Their accessible stumpage, however, supplies local needs, with limited amounts for going mills or an occasional new plant in the general trade. Public policy would not countenance an embargo upon the use of such resources.

Other public responsibilities are met by the same course, particularly paying the cost of administration and aiding the economic growth of local communities.

On the other hand, to dump quantities of public timber upon the market would waste resources without benefit to anyone. The publicly owned forests should serve as the governor of the machine. They should supply legitimate demands and aid competition always, but should not contribute to speculation or accentuate overproduction through forced sales.

Over three-fourths of the publicly owned timber in the United States is in the National Forests. These areas are the best example of public timberland administration developed systematically on a large scale to accomplish specific objects. The disposal of their timber is illustrative of the rôle which should be played by public forests.

PRESENT USE OF THE NATIONAL FORESTS.

Most of the National Forest timber lies back of the private stumpage in the main lumber-producing States of the West. It represents what was left in the less accessible mountain districts after 40 years of private selection under the public land laws. Approximately 30 per cent, all told, or 189 billion feet, can be logged to existing or projected transportation facilities within the logging costs now incurred by the local forest industries. By nature, then, over two-thirds of these public resources is a reserve for the future.

The administration of the National Forests for the past 11 years has aimed to utilize their timber as there is well-founded demand for it. Use by local residents, under the laws providing for free use and sales at cost to settlers and farmers, has been encouraged as part of the home-building policy of the Government. Hundreds of small operators—little sawmills supplying local communities with lumber, tie contractors for railroads, and camps cutting a few hundred or a few thousand logs for sale in local log markets—have been supplied with National Forest timber and rated as preferred customers of the Government. The supply of railroads, mines, and other local industries has been systematically developed.

Many sawmills built for the exploitation of private holdings have been supplied in part by purchases from the Government. These include National Forest timber interspersed with private, solid areas of public stumpage which going mills have found it advantageous to buy, and cases where private timber is exhausted and established plants must obtain their logs from the National Forests or shut down. And a considerable number of sales have been made which involve the construction of new sawmills, primarily to manufacture public timber for the general trade.

The Forest Service is required by law to sell National Forest timber at not less than its appraised value, subject to competitive bids. Timber is not priced on the latest fluctuations of the lumber market but upon average lumber prices prevailing over a period of 3 or more the Government should not increase the menace of overproduction, with its demoralization of lumber values and waste of stumpage. Some have indeed urged that National Forest timber be kept off the market altogether.

The preceding statement of National Forest business has made it clear that the actual sales of timber have had no appreciable effect upon conditions in the lumber industry. But the advocacy of administrative and legislative measures which would result in opening these public lands to unrestricted exploitation or in forcing their timber rapidly upon the market at sacrifice prices has unavoidably caused apprehension to many lumbermen. To some extent, this apprehension has intensified the movement to unload private holdings and over cut the market.

In short, the bearing of the National Forest timber on the upset conditions in the lumber industry of the West has been largely a psychological one, resulting from fear of the possibility of rapid exploitation, rather than the effect of the existing policies of disposal. Obviously it is essential that the Government's timber sale policy be clearly defined, consistent, and firmly established upon principles of sound public business from every standpoint.

THE DISPOSAL OF NATIONAL FOREST TIMBER.

The first obligation resting upon the management of National Forest timber is to supply legitimate demands. The requirements of communities and industries in the localities adjoining the Forests represent such a demand. The requirements of established sawmills, forming a part of the existing lumber production, represent such a demand, especially where private timber is not available. So does the supply of new mills where National Forest timber has, by the logic of local railroad and industrial development, become available and is mature and ready for use. The normal physical and economic factors which bring this tract or that tract of timber into demand from time to time should govern, rather than be restrained by arbitrary embargoes. On the other hand, public stumpage should not be used to promote speculative undertakings, or to finance undeveloped projects, or to subsidize business enterprises by furnishing raw material at less than its market value.

A second responsibility to be met in the administration of the National Forests is to secure sufficient revenue as soon as practicable to pay for their upkeep and compensate Western States for the withholding of property from taxation. These are public burdens which can not be ignored.

These income requirements can be met by the growing revenue from other sources and by increasing the annual cut of timber 500 million or possibly a billion feet. The growth of wood on available areas in the National Forests, their yearly crop in other words, will readily sustain this additional use. Such an increase in the cut from the National Forests, governed by the economic demand which comes to them in the gradual and normal development of western lumbering, may intensify competition in a few localities but can have slight effect upon general conditions in the industry. Conservative pricing of the public timber precludes "dumping" it upon the market at any time and restricts its sale during periods of depression.

In the long run the National Forests should serve in some degree as a governor of the industrial machine which manufactures and distributes forest products by maintaining not only competitive but stable conditions in the lumber trade. The public interest requires that the lumber industry remain competitive and National Forest timber should be employed to this end. The public interest demands at the same time that destructive overproduction be restricted and waste in the utilization of timber avoided.

A further consideration which may affect the disposal of National Forest timber is the development of the localities surrounding them. The economic growth of many communities is dependent to a considerable degree upon the use of resources in the National Forests. As far as these resources can contribute in reasonable ways to local development, this will necessarily influence the policy followed in their disposal. Timber on agricultural lands, for example, should be cut as soon as the need for their settlement is apparent. The industries supported by National Forest timber, however, should be permanent, not the migratory sawmill of old lumbering regions. Hence the cut of timber should not exceed the growing capacity of the Forest areas tributary to various manufacturing centers.

A final test of good management of the National Forests will be to prevent loss of timber through waste or deterioration as far as practicable and to improve their commercial value and productivity through the application of forestry. The gigantic task of making over 155 million acres of mountain forests can be accomplished but gradually, and for the most part only as economic conditions permit sales. Much can be done, however, by the intelligent selection of sale areas. Cases of special and rapid deterioration, like fire-killed or insect-infested timber or merchantable stands going to pieces on account of extreme old age, call for the earliest possible utilization.

The public timber should be a stable factor in the situation, not an uncertain one. Public opinion should support a settled policy for its disposal. This should provide for real demands and public interests and be quick to forestall monopoly; but it should not, through forced sales or yielding to pressure for speculation or ill-advised efforts to force exploitation, add to the waste of overproduction.

A PUBLIC FOREST POLICY.

Progress toward an adequate forest policy rests mainly upon cooperation between the public and the lumberman. Little can be done by either single handed. A means of ready and authoritative interchange of views should be the first step.

It seems clear from this review of the forest resources of the United States and the conditions under which they are used that our forest policy has not gone far enough.

Within the next 20 years increasing portions of the United States will face local timber shortages and higher lumber prices as the remaining stumpage moves farther away. This is the fundamental forest problem which the public and the lumber industry must work out.

Overproduction, waste of timber, and lack of growing forests result in the last analysis from the wrong kind of ownership. Public policy should seek first to make private timberland ownership more stable and State and Federal ownership more general.

The bad conditions in the principal forest industry—lumbering—are of no permanent benefit to anyone. Suspicion and hostility toward this industry will not help the public and get nowhere in meeting the practical needs of conservation. The lumber industry must work out its own salvation largely; but it should be the concern of the public not only to keep the industry competitive but to cooperate with the lumberman in making his business more efficient.

Much has been said about the effect of growing charges for transportation upon the cost of lumber. The great bulk of the timber now left is in the far West, remote from the main consuming regions but largely within reach of the seaboard. The value of this resource to the public is diminished greatly by the excessive cost of hauling. This prompts the suggestion that cheaper transportation, specifically the building up of a merchant marine, bears a close relation to the forest problem of the country.

The public forest policy may wisely promote the most economical and efficient use of timber products. The end to be sought here is the maximum service to the industries and consumers of the country from its forest resources. Technical studies of timber and its uses, improved processes in seasoning, preserving and fire-proofing, and the development of by-products come under this head. The best uses of wood in relation to other materials in the many fields of consumption, both where it should and should not be employed, is another broad phase of the problem. A third is the investigation of foreign markets for forest products and strengthening the American industry through building up its export trade.

Finally it has been made clear that a satisfactory working out of the forest problem of the United States requires a large degree of public and private cooperation. The underlying thought in the suggestions which have been made is that this problem should be approached by the public and the industry in a cooperative spirit rather than a divided or antagonistic one. Continuous study will be necessary. Much of this will devolve upon the agencies already constituted to deal with public activities in these fields—the Federal Trade Commission in matters of business organization and methods, the Forest Service in the administration of the National Forests and technical investigation of timber products, the Department of Commerce in the extension of foreign trade.

The development of our forest policy, however, requires continued cooperation between the existing public agencies and the lumber industry. The joint consideration of many problems which the present inquiry has stimulated should be kept alive and fruitful. An effective means should be provided for a prompt expression of judgment on new developments in forest matters from the industrial agencies concerned, for initiating cooperative inquiries and assembling facts, and for rounding up and presenting all sides of proposals.

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